INDUSTRIAL FINISHING

TEXAS ENGINEERS LIBRARY
College Station, Texas
MAY 12 19

Pinchin Johnson

the Industrial Paints Service

Established 1834

4 CARLTON GARDENS • LONDON • S.W.1

PRINCIPAL P.J. BRANCHES AND STOCK DEPOTS

BELFAST:	Dalton Buildings, Dalton Street	Belfast	58643
BIRMINGHAM, 1:	King Edward's Place, Broad Street	Midland	(D42-3-4
BRIGHTON, 1:	26 Elder Place	Brighton	23739
BRISTOL, 1:	37 Welsh Back	Bristol	207e5
GLASGOW:	Ocean Chambers, 190 West George Street	Douglas	3281-2
LEEDS, 11:	123 Water Lane	Leeds	24377
LIVERPOOL, 20:	72 Brewster Street	Liverpool, Bootle	2121
MANCHESTER, 3:	22 Bridge Street	Blackfriars	3800
NEWCASTLE-ON-TYNE, 1:	Pudding Chare	Newcastle-on-Tyne	21919
SOUTHAMPTON:	41 Lower Canal Walk	Southampton	3648

THE NEW APPROACH TO OLD PROBLEMS
EFFLUENT DRAINAGE IN POLYTHENE.
INDUSTRIAL FABRICATED PLASTICS
P.V.C. DUCTING FOR ACID FUME EXTRACTION
LIP TYPE ACID FUME EXTRACTION UNITS IN P.V.C.
RIGID P.V.C. LININGS FOR PLATING TANKS, ETC.

PRODORITE LTD

ENQUIRIES TO

HEAD OFFICE: EAGLE WORKS · WEDNESBURY

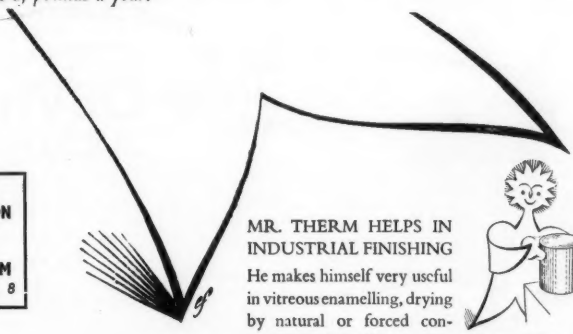
TELEPHONE: WEDNESBURY · 0284 · 5 LINES

LONDON OFFICE: ARTILLERY HOUSE · LONDON, S.W.1

TELEPHONE: ABBEY 3816 · 5 LINES

TEXAS ENGINEERS LIBRARY
College Station, Texas
MAY 12

One of the most practical advantages of gas is the speed with which it gets into action. With gas there is no long waiting and warming-up process—its full heat is available day and night at the turn of a tap. And in the same way there is no waste of heat or fuel at the end of a job. Such speed is worth minutes every working hour—and hundreds of pounds a year.



Visit the **GAS SECTION** at the **B.I.F. BIRMINGHAM** April 27—May 8

MR. THERM HELPS IN INDUSTRIAL FINISHING

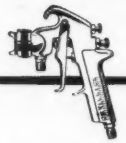
He makes himself very useful in vitreous enamelling, drying by natural or forced convection, radiant heat drying, paint curing, and metal finishing of all kinds of articles

Mr. Therm burns to serve you

THE GAS COUNCIL · 1 GROSVENOR PLACE · LONDON · SW1

introducing SPRAYLOGICS

—the Facts of SPRAY PAINTING



In the face of present day costs no industry can afford hit or miss methods of painting which waste paint and money — and result in bad finishes. Now, from their unrivalled experience, DeVilbiss · Aerograph make available the real "know-how" of spray finishing in a series of technical publications never before obtainable. These will enable you to check with certainty whether you are getting the most up-to-date efficiency in your paint shop. They will be supplied free on request — write at once to Dept. 21P for your name to be put on the mailing list.

No. 1 in a new series of publications

Offered free to all interested in better painting and finishing.

"THE ABC OF SPRAY PAINTING EQUIPMENT"

One hundred and forty-four questions and answers on the use, care and adjustment of all Spray Finishing Equipment. A uniquely helpful handbook covering practically every point arising in everyday spray finishing practice. Make sure of your copy — ask now!

DEVILBISS AEROGRAPH

The SYMBOL of SERVICE

Branches and Showrooms :
LONDON · BIRMINGHAM · BRISTOL
GLASGOW · MANCHESTER

The Aerograph Co. Ltd. Lower Sydenham, London, S.E.26 *Tel: Sydenham 6060 (8 lines)*

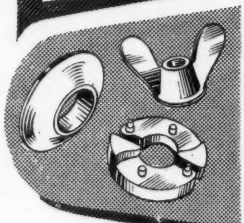
TA 5225

3 Outstanding SUCCESSES

SUPER GLEAMAX
BRIGHT NICKEL

Unequalled brightness of deposit.
Superior levelling.
Eliminates nickel finishing.
Reduces polishing costs.
Single addition agent for maintenance.

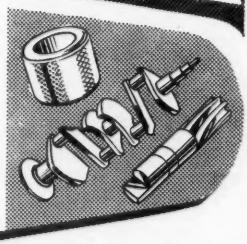
CUPROBRITE
BRIGHT COPPER



Cathode efficiency 98/100 per cent.
Unrivalled for zinc diecastings.
Exceptionally good on steel and brass.
Simple to operate.
Easy to maintain.

HARDFAST
HARD CHROME

High cathode efficiency.
75 per cent. thicker deposit without increased current or plating time.
Smoother plating without nodules.
Minimum build up on edges.



W. CANNING & Co LTD

Gt. Hampton Street, BIRMINGHAM London . Sheffield

For a FINE FINISH

— so essential to a fine product —

You need

MODERN STOVING & DRYING PLANT

Our extensive experience in the application, design and production of all types of OVENS—Stationary and Conveyor for all enamelling, lacquering, cellulose finishing and every drying operation by Convection and Infra-Red process—is freely at your service.

We also specialise in Dust Extraction Systems for Polishing and Grinding operations and Wood Working machinery, Fume Extraction and Ventilating Systems, Tanks for all Industrial Processes, Storage, etc.

Get in touch NOW.

Telephone: Smethwick 1571-2-3-4
Telegrams: "Grifoven, Smethwick"

GRIFFITHS *the* **SATISFACTORY PLANT**

A.E.GRIFFITHS (SMETHWICK) LTD. BOOTH ST, HANDSWORTH, BIRMINGHAM.

Clinton-Wall

free from grease and ready for a perfect finish

One degreasant will not fulfil all degreasing requirements. If, therefore, you are experiencing difficulties let the B.H.C. Laboratory Service solve your problem — without obligation. There are many grades of Collex at your disposal.
Write or phone today for a Technical Representative to call.

COLLEX
DEGREASANTS

will banish any greasy deposit

B.H. CHEMICALS LTD. Merton Abbey Laboratories
Abbey Road, London, S.W.19 Tel: LIBerty 1021 (4 lines)

Associated Companies: *Colloidal Detergents of Australia Ltd., Sydney, Australia. Chemical Services (Pty.) Ltd., Johannesburg, South Africa. And at Copenhagen, Amsterdam, Brussels, Paris, Lille, Lyons.*

THE WORLD'S FINEST GUN

FOR LARGE SCALE INDUSTRIAL PRODUCTION

The A.I.D. Model 7 Gun falls right into line with the need of industry to effect increased production and saving of man-hours. This gun has been put to every known scientific and practical test, and its economical performance and mechanical perfection have made it the outstanding choice of great industrial organisations all over the world.

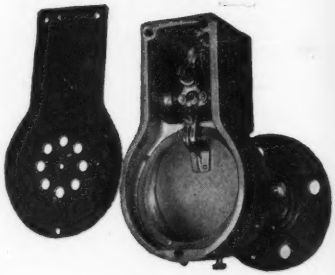
AND THE WORLD'S FINEST SERVICE

No service can excel the A.I.D. INSTANT RESERVE REPLACEMENT SERVICE, which ensures 100% man-hour efficiency every hour of every day—New or reconditioned guns are exchanged instantly for your worn or damaged guns. A.I.D. not only supply guns, but EVERYTHING behind the gun. Whether your needs are large or small, do not hesitate to request the services of our technical organisation.

CONTRACTORS TO THE WAR DEPARTMENT OF THE U.S.A.

Sole Manufacturers: AIR INDUSTRIAL DEVELOPMENTS LIMITED, Aidspray Works, Shenstone, nr. Lichfield, Staffs, England. Phone: Shenstone 341/5. Grams: Aidspray, Shenstone. LONDON, 28 South Molton Street, W.1. Phone: Mayfair 6318. Grams: Aidspray, Wesdo.

AIR FLOW SWITCH



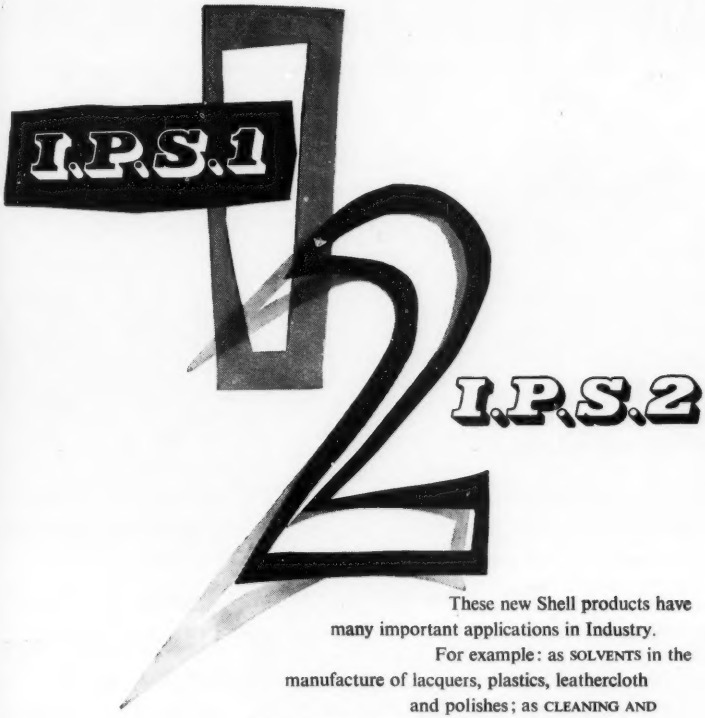
DETAILS ON REQUEST

- **This switch operates as a protective device in all cases where the maintenance of a continuous flow of air is of importance.**
- **A totally enclosed mercury switch ensures absolute reliability even under the most adverse conditions of dust and dirt and also provides complete protection against risks of explosion through sparking contacts in an atmosphere charged with inflammable vapours.**
- **The switch may be used in an ambient temperature up to 350° C. and will operate on a differential as low as 0·1" w.g.**
- **The mechanism functions on air pressure or suction against the restoring force of gravity; no springs of any kind are used.**

DELTA TECHNICAL & COMMERCIAL SERVICES LTD.

ELEKTRON WORKS, SYDENHAM ROAD LONDON, S.E.26

Phone: Sydenham 4710. Grams: Deltcos, Forest, London



These new Shell products have many important applications in Industry. For example: as SOLVENTS in the manufacture of lacquers, plastics, leathercloth and polishes; as CLEANING AND DEHYDRATING AGENTS in the photographic printing and electroplating trades.

I.P.S.1 specification

PURITY: 99% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY at 20°/20°C: 0.785-0.790.
COLOUR: Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 81-83°C.
NON-VOLATILE MATTER: Maximum 0.01% weight.

I.P.S.2 specification

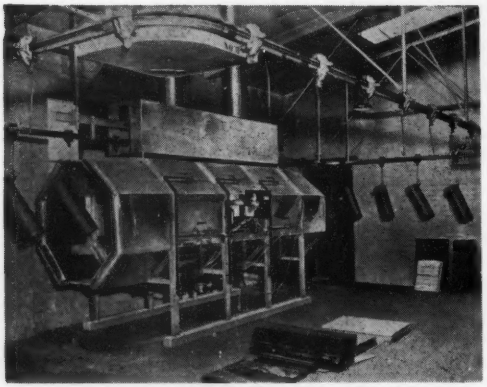
PURITY: Minimum 85% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY: at 20°/20°C: 0.815-0.820
COLOUR: Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 78-81°C.
NON-VOLATILE MATTER: Maximum 0.01% weight.

SHELL

Shell Chemicals Limited, 105-109 Strand, London, W.C.2. Tel: Temple Bar 4455
(DISTRIBUTORS)

Divisional Offices: Walter House, Bedford Street, London, W.C.2. *Tel:* Temple Bar 4455. 42 Deansgate, Manchester, 3. *Tel:* Deansgate 6451. Clarence Chambers, 39 Corporation Street, Birmingham 2. *Tel:* Midland 6954. 28 St. Enoch Square, Glasgow, C.1. *Tel:* Glasgow Central 9561. 53 Middle Abbey Street, Dublin. *Tel:* Dublin 45775. A3

To speed production—



A tunnel of Bratt Colbran Radiant Units stoving finishes on food canisters. (By courtesy of Messrs. Grundy (Teddington) Limited.)

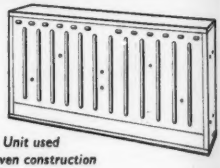
Write for technical advice on installations to

BRATT COLBRAN LIMITED

LANCELOT ROAD, WEMBLEY, MIDDX. Wem. 6221

Bratt Colbran
INFRA-RED RADIANT UNITS

With Britain calling for higher and higher productivity, Bratt Colbran gas-fired Radiant units are playing an increasingly important part in the industrial life of the nation. With their aid, drying and stoving times can be reckoned in minutes. Capable of dealing with parts of a wide range of sizes and shapes, these highly efficient units have already meant higher output with lower processing costs in scores of branches of industry.



The Unit used in oven construction

★ **B.I.F. CASTLE BROMWICH APRIL 27—MAY 8.** **Visit our Stand No. D 656.**

25% longer life

than any other

mop of conventional type. The "Goodall" Aircool Bias Wheel also combines cooler polishing with less composition waste, and gives most excellent results when used for colouring off and finishing or even cutting. It is also suitable for Contour polishing or can be used as a Contact wheel.

Can be supplied to fit tapered spindles or with parallel bore.

1ST FOR FINISHING!

Goodall Brand

JOHN HAWLEY & CO. (WALSALL) LTD.

GOODALL WORKS
BLOXWICH ROAD, WALSALL, STAFFS

Established 1837

Telephone: BLOXWICH 66251 Telegrams: ROPE, WALSALL

AS USED BY LEADING MANUFACTURERS

WALTERISATION
Regd. Trade Mark
QUALITY PHOSPHATE RUSTPROOFING

FOSCOTE
Regd. Trade Mark
DESTROYS RUST

AGENTS STOCKISTS & DISTRIBUTORS THROUGHOUT THE WORLD

DERAN
Regd. Trade Mark
REMOVES RUST

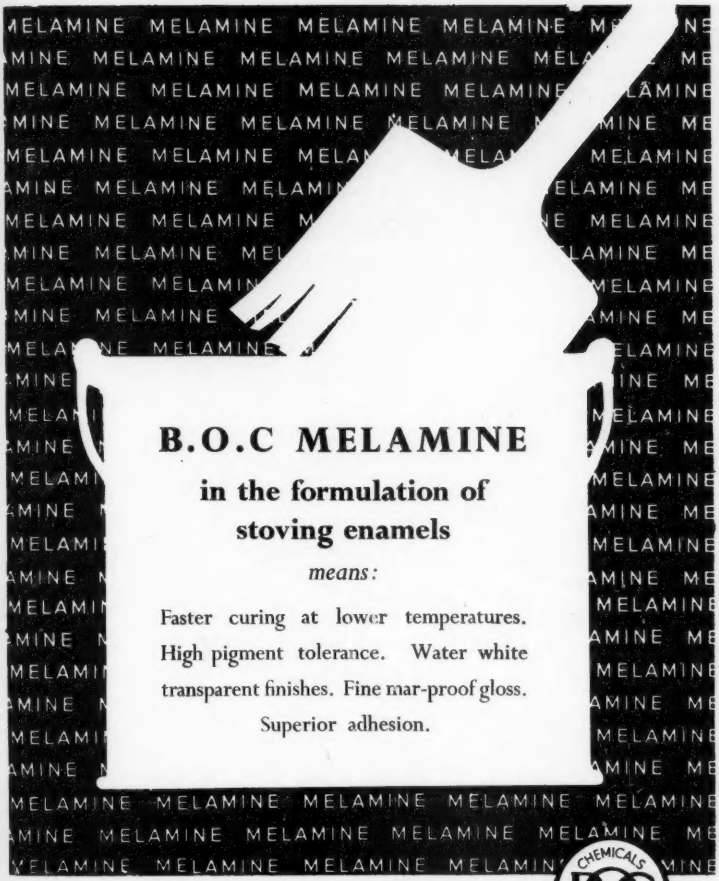
THE WALTERISATION CO. LTD
PURLEY WAY, CROYDON, ENGLAND
Telephone: Croydon 2791 Telegrams: Rustproof Croydon

Pins and Paint!

The production of protective and decorative coatings for the smaller necessities of life frequently presents more problems than the manufacture of finishes for goods of a more massive kind. Problems large or small are easily overcome and satisfactorily solved by using Kearsley *Specialised* Industrial Finishes —finishes which are specially designed to meet individual needs.

Hammer Finishes (Stoving and Air Drying)—Heat Resistant Enamels—Wrinkle Finishes.—Polychromatic and Flamboyant Finishes—Acid and Alkali Resistant Coatings—Hot Spray Finishes — Stoving and Air Drying materials.

Robert Kearsley & Co. RIPON — YORKS



for supplies and prompt service write to:

CHEMICALS DIVISION

THE BRITISH OXYGEN CO LTD

VIGO LANE CHESTER-LE-STREET CO. DURHAM

Telephone: BIRTLEY 145

MANDER'S
INDUSTRIAL FINISHES

Full description in Technical Pamphlet No. 10

ON REQUEST TO

MANDER BROTHERS LIMITED · WOLVERHAMPTON

EDITORIAL DIRECTOR:
DR. W. F. COXON,
M.Sc., F.R.I.C., M.Inst.F.

EDITOR:
W. J. ROBERTS

A monthly journal covering the whole range of finishing operations for wood, metals, plastics, etc.

Published Monthly
by
ARROW PRESS LTD.,
157 Hagden Lane,
Watford, Herts.

Price 2/6d. per copy.
30/- per year, payable in advance, which includes FREE issue of the Industrial Finishing Year Book.

INDUSTRIAL FINISHING

(Incorporating "CORROSION")

APRIL 1953

FEATURE ARTICLES

	Page
COMMENT BY "ARGUS"	615
I.M.F. ORGANIC SECTION CONFERENCE	619
NITROCELLULOSE AEROSOL APPLIED LACQUERS ...	647
INFRA-RED STOVING IN THE MOTOR INDUSTRY ...	656
AUTOMATIC PRINTING AND COATING OF STEEL SHEET	661

MISCELLANEOUS

NEW COLOUR INDEX	618
PLATING CONTROL OF PHOTOGRAVURE ROLLS ...	655
BOOKS	666
I.M.F. SPRING CONFERENCE	668
NAMES IN THE NEWS	672
ADVERTISERS' INDEX...	675

Copy and Blocks should be available to us by 20th of the preceding month.

They should be sent to:
INDUSTRIAL FINISHING
157 Hagden Lane, Watford, Herts.
Telephone: Gadebrook 2308/9

Finished in next to no time

The boxer uses his physical powers plus ring-craft knowledge to make short work of his opponent; similarly the use of the hot-Spray Process plus our paint experience can finish many jobs so much quicker.
Our special knowledge of the process and our manufacturing resources enable us to produce for either air-drying or stoving the right Hot-Spray solid content enamels and lacquers for all products. One coat gives a finish superior to 2/3 coats of normal Cold-Spray and no thinners are required. Coaches can be finished with this process—it can take only ten minutes to spray transport buses.

ADVISORY SERVICE

We invite you to allow us to investigate the possibilities of using Hot-Spray for your finishing. It'll cost you little but it may save you many pounds.

International Paints Ltd.

Head Office: **GROSVENOR GARDENS HOUSE, LONDON, S.W.1.**
TELEPHONE: VICTORIA 3161 (10 LINES) *TELEGRAMS: CORROFOIL, SOWEST, LONDON*
Branches at: Cardiff, Glasgow, Hull, Liverpool, London. Newcastle, Southampton, West Hartlepool.

REGISTERED TRADE MARK

MAIN FACTORY IN U.K. FELLING-ON-TYNE

ASSOCIATED FACTORIES AT

BERGEN	NORWAY	KOBE	JAPAN	SAN FRANCISCO	U.S.A.
BILBAO	SPAIN	LE HAVRE	FRANCE	SYDNEY	AUSTRALIA
COPENHAGEN	DENMARK	MEXICO CITY	MEXICO	TRIESTE	ITALY
GENOA	ITALY	MONTREAL	CANADA	VANCOUVER	CANADA
GOTHENBURG	SWEDEN	NEW YORK	U.S.A.	WELLINGTON	NEW ZEALAND
HAMBURG	GERMANY	RIO DE JANEIRO	BRAZIL		

Industrial Finishing

VOL. 5 APRIL, 1953 NO. 58

Comment . . . by ARGUS

MAYBE 1953 will see the professional decorator with more business on hand than in 1952. This is certainly the view expressed by Mr. Eric B. Calvert, Chairman and Managing Director of Blundell Spence and Co. Ltd. It followed, in fact, a statement by Mr. W. R. Gillespie who, when speaking on behalf of the National Federation of Master Painters and Decorators, declared that the public were being given too much encouragement to decorate their own property and to dispense with the assistance of the professional. Presumably Mr. Gillespie was referring to the various magazine and newspaper articles which have appeared in which hints and advice were given on home decoration.

Nevertheless, the real encouragement to the amateur decorator has surely sprung from the terrific cost increases which have been brought into being by the professional decorator himself. I know of one kitchen to be painted and decorated which was seen by three painters and decorators and where the quotation varied from £28 to £46. Of course one may assume that the lower figure was a cut-price figure and therefore the quality of the work would be bad, but unfortunately, from past experience, one cannot assume that the highest figure is going to give a superlative job in terms of cost per foot or whatever other unit of comparison is considered.

It springs to mind quite obviously that the painting and decorating trade has not got down to the serious conception of modern business which is to cost adequately the job in question. If work is short there is a tendency to cut the price to the bone to get the business—if they have a few jobs on hand decorators tend to ask for more. As a result, there is no uniformity in costing. Of course the paint industry itself is giving as much help as it can. Mr. Calvert, mentioned above, said recently:

"This encouragement (to the amateur) I notice, continues. We at Blundells have always been aware of the inherent dangers of the amateur using the brush. Even best-quality paints can lose a high reputation in the hands of amateurs who misuse them. Let us hope there will be a continued effort to make the public aware that it is foolish to apply paint themselves without being thoroughly conversant with the products they use, the 'temperaments' of paints when responding to different surfaces, their drying properties, and

so forth. We are working to this end, encouraging the public to employ the services of the professional.

"The amateur is frequently apt to regard any paint as 'all purpose' and is therefore surprised and critical when a product does not live up to this consumer-styled claim. A skilled decorator, on the other hand, knowing the qualities of paint has the intelligence, experience and knowledge to recognise a product's limitations.

"Speaking for my own company, I can say that since this firm was founded in 1811 we have conscientiously set out to satisfy the professional—not the amateur. In adopting this policy we know we are aiming at the highest standards in paint manufacture. The bulk of our business is with the professional; our retail sales to the public are incidental. We have, for more than a century, enjoyed the full confidence of the professional decorator and it is with him that we intend to keep faith."

But this is only half the story. If there is one aspect of business in Britain which is still working on a mediaeval costing principle it is painters and decorators and general jobbing builders. They seem to be unable to decide precisely what a job will cost, and show the greatest disinterest in being compelled by the customer to give an estimate. Where they do give an estimate there is often a tendency if they have cut the price to cut the job quality.

Surely painting and decorating as well as jobbing building, is no more difficult to cost properly than any other aspect of business. It is just a question of getting down with expert knowledge to decide what is to be done and to allocate the cost. But so many master painters and decorators do this job today, tomorrow they are specialised plumbers and the day following they become bricklayers or carpenters. In fact there was one celebrated instance where the same man attended on two successive days to do, on the first day a bit of electrical contracting, and on the second day a bit of painting and decorating. On his ultimate bill he presented two different charges for his work on two successive days because the rates for electricians and painters are different! Another painter and decorator took a job involving plumbing, and successfully blew up an old and a new fuel central heating boiler!

Of course the paint industry is setting out to do whatever it can to help the master painter and decorator, but it is certainly suggested that it is about time that he set out to help himself.

Contemporary or Traditional?

RECENTLY the Design and Industries Association held an interesting exhibition at Charing Cross Station in which they furnished two identical rooms, one in contemporary style and one in the modern manner which the trade has found to be most profitable. Something like 30,000 visitors balloted an opinion on the two rooms and, broadly speaking, something like 18,000 voted for the contemporary furnishing and 12,000 for the best trade sellers. One has been unable to find out whether the actual selection of contemporary furnishings and best trade sellers was done in a completely neutral manner, for obviously the Design and Industries Association had an interest in getting a contemporary gain. However, the net result of the voting cannot entirely be overlooked—there is a movement on foot through both sexes and in all ages, although the youngsters are more likely to visit such an Exhibition and thus the vote may not be truly representative, to be interested in contemporary designs. Probably the real answer lies somewhere in between. In short, that the best trade sellers could adopt some contemporary ideas—but of course traditional designs are obviously well established. The trouble about design and design comparisons is always that it is so much of a subjective decision. There are many who go for the contemporary because it is different, and they assume that because it is new it must be better, whilst, on the other hand, there are many who think that because something has sold for years and years it always will. Contemporary design and best trade sellers reflect two different developments. The best trade sellers are those that have

Our illustrations show, on the left, the room furnished with articles that the trade has found most profitable and, below this, a room furnished in a contemporary manner, welcomed by the Design and Industries Association.

There seems little doubt that the Display Officer responsible for the illumination has used this well in favour of the contemporary room. The one not favoured by the "light" of the Design and Industries Association has been hidden under a bushel.

Taking the same pieces of furniture and showing inverse attention to lighting and display, one hazards a suggestion that the "old fashioned" could appear bright and shiny and the "new fashioned" quite dull and dismal!

established themselves because the public have continued to buy them and accept them. Contemporary design always suffers from the possible disadvantage that the design in question might be a passing whim which will be here today and gone tomorrow. The difference between the Design and Industries Association and industry itself is, of course, the difference between the organisation which has to invest capital and risk it upon its own beliefs, and the organisation which sets out to establish an ethical conception of design based on its own beliefs, but has not to face the responsibility of financing these beliefs.

No doubt the trade would need a much higher majority over a much wider field and geographically more select than Charing Cross Station to make any serious alteration in its approach based upon market research and sales data sheets.

The "Organic Boys"

THERE was a most successful meeting of the Organic Finishing Section of the Institute of Metal Finishing held recently at the Charing Cross Hotel. The Conference itself is reported in full in other pages of this issue, and the occasion was chosen to

select an Organic Committee of the Institute by popular vote. There is no doubt that this is certainly a committee founded upon a variety of interests in the finishing field. However, what is more, one could not help feeling that the committee was making history. As everyone knows, the origin of the Institute of Metal Finishing was, of course, the old Electrodepositors' Technical Society, where the primary interest was in electroplating. Quite naturally the emphasis of interest in the old E.T.S. was largely around this subject, and no one can deny that the old E.T.S. did much to convert electroplating from a reactionary art to more of a science. In that field they did an excellent job.

However, when one compares the interest value of electroplating with organic finishing, one is comparing a relatively small industry with an extremely vast one, and this new Organic Committee may be new to the Institute, but they represent a tremendously powerful group of people interested in paint. It will not be long before this Organic Section is a new tail wagging the dog, but that in itself should not be a bad thing because finishing, after all, as far as the user is concerned, is not tied up with any particular process. The user is not concerned with paint, galvanizing, metal spraying, electroplating or any other process as such, but only as a means to an end, to decorate and protect his product. All processes are, in themselves, virtually competitive, and this extension of interest of the old E.T.S. to the new all-embracing Institute of Metal Finishing is an excellent thing in principle, but in practice one cannot help feeling that eventually the "organic" boys are going to be more important than the "inorganic" ones.

Meantime we will wait and see!

New Colour Index

IT is announced by the Society of Dyers and Colourists and the American Association of Textile Chemists and Colorists that the second edition of the *Colour Index* will be published in 1955. The work has been completely redesigned and brought up-to-date with the co-operation of all the dye manufacturers in Great Britain, America, Western Europe, India, and Japan. The second edition will be in three main parts:

Part I (in three volumes each of approximately 1,000 pages) will deal with all commercially homogeneous dyes and pigments in current use (approximately 5,000 dye entities and 25,000 commercial names) within groups relating to their main usage method. The data will comprise the commercial name and manufacturer's initials, methods of application, fastness properties, established usages, reactions on the fibre, and literature references relating to application. Each usage group is subdivided into hue groups by reference to a Hue Indication Chart designed specially for the purpose.

Part II (one volume of approximately 700 pages) will contain data relating to chemical constitution, method of preparation, patent and literature references relating to manufacture or constitution, solubilities, and reactions in substance for approximately 3,800 dyes and pigments. The first edition recorded 1,316 constitutions, and this very big increase is partly due to the fact that many co-operating dye manufacturers have, for the first time, disclosed the constitution of certain of their dyes.

Part III (one volume of approximately 400 pages) will contain the general index. The Commercial Names Index will include the names of dyes not in current use, and the names of dyes now disclosed by the manufacturers as standardised mixtures.

The Society will be greatly helped in this major undertaking by an indication of the immediate demand, and for this reason has fixed a special prepublication price of £30 for the complete work, payable before 30th June, 1953. There is also a scheme for three annual payments of £11. The price on publication in 1955 will not be less than £35.

A descriptive leaflet and an order form will gladly be sent on application to the Society of Dyers and Colourists, 19 Piccadilly, Bradford, Yorkshire, England.

These rates do *not* apply to the U.S.A. and non-British territories of Central and South America; information on rates of payment applicable to these areas can be obtained from the American Association of Textile Chemists and Colorists, Lowell Textile Institute Lowell, Mass., U.S.A.

INSTITUTE OF METAL FINISHING

Inaugural Meeting of the Organic Group

The inaugural meeting of the organic section of the M.F.A. was held in the Charing Cross Hotel on 19th March last. "Industrial Finishing" regards this event as of considerable importance in the history of finishing in this country and decided to put on record as full an account of the entire meeting as the limitations of space and time permitted. The proceedings fall into three sections: First, the luncheon and the business meeting, which are dealt with in this section. Second, the first paper and discussion followed by a tea break and the voting. Third, the final paper and discussion.

THE President of the M.F.I. (Mr. H. Silman) welcoming the visitors and guests, said:

"We have among our guests Mr. L. O. Kekwick, President of the Oil and Colour Chemists' Association; Mr. J. W. Cole, President of the National Paint Federation and Immediate Past President of the Research Association of the British Paint Manufacturers; Mr. Carter, President of the British Paint Manufacturers' Association; and Mr. W. F. Wilson, Chairman of the Industrial Finishing Luncheon Club."

He then called upon Mr. Cole, the guest of honour, to say a few words.

MR. J. W. COLE: I am honoured at being invited to be present at the inauguration of your new Organic Finishing Group and at having the opportunity of saying a few words to you on this most interesting event.

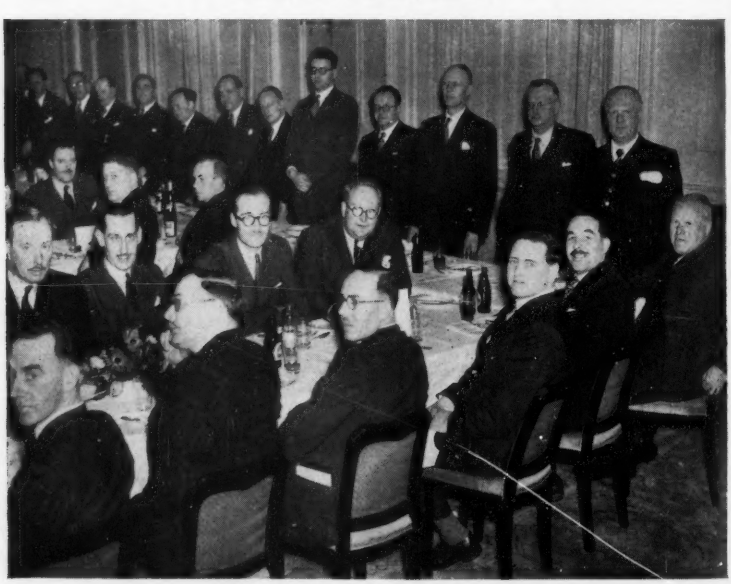
As we are all aware, there is a great deal of research and technical development taking place not only in research associations but also in the factories of individual paint manufacturers with the object of producing and continually improving organic finishes. Likewise, a good deal of care and thought is devoted to the production of adequate finishing equipment, sprayguns, dipping plants, ovens, conveyors and the like. Equally, there is a vast field of knowledge, undoubtedly, in the individual factories of the manufacturers of metal products as to how to make the best use of the finishes and equipment available in order to develop really effective finishing techniques. Nevertheless, there must surely be a great opportunity for a good deal of co-operation in this important branch of activity of the finishing of metal products in the factory by the user.

With so many people—I except, of course, the enlightened audience that we have today—the general practice and policy if anything goes wrong with the finishing coat, is to blame the paint. As a paint manufacturer, perhaps I speak with a certain amount of feeling on this subject because we know only too well that there are often other considerations which enter into the problem which really have nothing at all to do with the quality of the paint supplied.

Another point that we must always bear in mind is the psychological effect in that a really well finished article has a great deal of sales appeal, which is of great importance to us as a nation as we have to depend so much on exports for our lifeblood.

For these two reasons alone, it is most valuable that you should develop some little activity in investigating finishing problems from the point of view of the user. It appears to me that your new group has a most fascinating field for investigation,

These two photographs, from the left-hand and right-hand ends of the hall respectively, were taken during the inaugural luncheon and show what is probably a unique gathering of personalities from both the supply and user sides of the finishing industry



Mr. J. W. Cole, President of the National Paint Federation and Past President of the Research Association of British Paint Manufacturers, speaking at the luncheon

which would appear to divide itself into three main parts: first, the design of the article and the type of metal used; next, the method of finishing to be adopted; and that leads to the type of finish which will best suit those two considerations.

On the design will depend very much the ease and cost of production and the method of finishing. There is a good field for investigation here. Much that is ornate or full of corners can be simplified into pleasing lines with a corresponding increase in the efficiency of the production and greater possibilities of securing attractive finishes.

The type of metal selected will be of great importance because so often the painting process depends on this factor. All metals must be thoroughly cleaned and free from dust, grease or dirt before painting, but some require considerably greater effort in this respect than others. It may be taken as a cardinal factor that any failure in the sense of the formation of rust spot or breakdown of film is traceable to inadequate finish before the painting operations were undertaken. That also provides a field for investigation.

Methods of finishing, whether by dipping or by spraying, in their infinite varieties, will also have a bearing on the type of finishing material selected, as will also the question of stoving or air drying. Therefore, methods of application such as automatic dipping, spraying, electrostatic spraying and also the customary method with the conveyor will no doubt receive your attention, and you will no doubt devote some attention to the question of infra-red ovens. There are all kinds of other fields; we are beginning to think about centrifugal and steam spraying. In the field of equipment there must be a tremendous amount to which you can give thought.

What does all this build up to? I believe it builds up to the plain fact that the paint coat, being the final coat, carries the responsibility for much of the appeal of the job to the eye and its acceptance to the customer, and, therefore, sound design and an economical, durable and attractive finish must all come under the survey of your group.

I should not presume to offer you any advice, but I should like to make two points which may be worthy of your thought. The first one is that we must bear in mind that, while many chemists are engaged today in research and development work, there are also a great number both of chemists and of technologists engaged in your factories studying finishing problems. Equally, there is also a well-established and well-recognised procedure of close collaboration between the manufacturers of metal articles and their suppliers of organic finishes and their equipment manufacturers. I hope, therefore, that we shall rightly regard the field available for the new Organic Finishing Group as complementary to all this very con-

siderable activity and not in substitution for it. Equally, there are a number of organisations already in existence which may be developing certain aspects of investigation into fields which may touch on your activities, such as the work of the Oil and Colour Chemists' Association and the Corrosion Groups in the Iron and Steel Association and the Society of Chemical Industries. It seems to me that in such cases it is much better for societies and bodies to collaborate with each other rather than that each should endeavour to do the same work.

That brings me to the point that, just as you have your own four or five local branches, where papers are read and discussed, so it might be useful to follow the practice of organisations similar to your own and have joint meetings with other bodies where there exists a common interest. By that means overlapping and misunderstanding can be avoided and greater use can be made of accumulated knowledge. I hope that this suggestion about contact and collaboration with other bodies will be considered worthy of your thought and that you may from time to time arrange meetings with such organisations as I have mentioned.

It is a very great privilege to wish you the very best of good fortune upon the inauguration of your new group. I put as its ultimate aim the finishing of metal articles with the utmost preservative and decorative effect with due regard to production costs. If that is achieved, you will contribute materially to the strength of our own vital lifeline, which is a steady and increasing flow of high quality well-finished exports to every part of the globe.

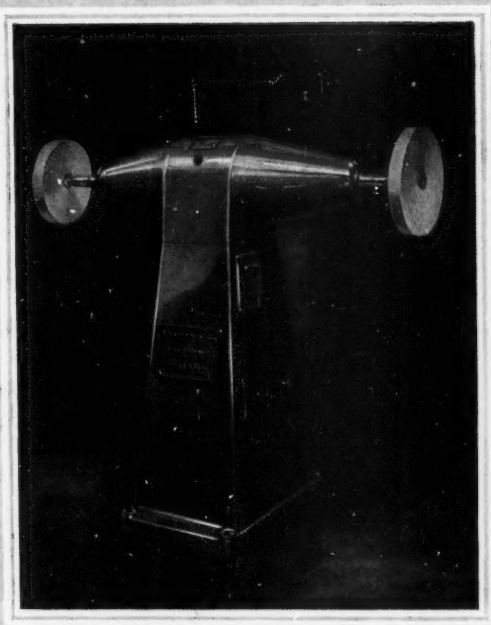
At this point, the Inaugural Luncheon having ended, the party passed along to the lecture room and the President introduced the speakers, gave a brief account of the growth of the Institute, and described the system to be adopted for the ballot for a permanent committee.

THE PRESIDENT: Our first meeting is a business one, the Organic Finishing Group, the objects of which have been made fairly clear in various publications, both favourably and adversely from time to time, is about to be constituted. At lunch Mr. Cole gave us a much better outline of what it is hoped to achieve than I could possibly do.

The idea of the Group is to provide a forum for the development and publication of information relating to the application of paints as supplementary to the existing organisations in the paint industry which are chiefly concerned with its manufacture. We hope that we shall be able to work closely in association with other technical and professional bodies in the paint industry and that this Group will fill a need which is not being met at the moment by any other organisation in this country or in the the United States. In fact, a little while ago the American journal, *Metal Finishing*, complimented us on the proposal and expressed some hope that the same idea would be taken up in the United States. As you can understand, there is an enormous field of interest in the development of techniques for the application of paint and all the aspects of finishing by organic materials which cover such an enormous range of industries.

The Institute of Metal Finishing was formed a couple of years ago as a broadened development after the old Electrodepositors Technical Society, which was founded in 1925. So the body is an old-established one. It has a membership of well over 1,000—it is approaching 1,300 now—and it provides an amazing service to its members in the way of publications of all descriptions. The actual cost of publications sent to members is greater than the subscription itself because, with one or two small exceptions, the work is entirely voluntary.

In establishing the Organic Finishing Group, the Institute of Metal Finishing intends that the Group shall be substantially autonomous within the constitution of the Institute, and it is intended that at this meeting a Committee shall be elected which will take over the organisation of the Group. The Committee will have a free hand in arranging its own programmes, to commence next autumn, and in deciding where and what types of meetings shall be held. You will appreciate that in the first instance there will probably be only



QUIETER · SMOOTHER · MORE EFFICIENT · MODERN

A product of Britain's foremost manufacturers of Polishing Shop equipment

MorrisFlex

NON-STOP POLISHING LATHE
WITH INDEPENDENT SPINDLES

B. O. MORRIS LTD., BRITON RD., COVENTRY
Telephone Coventry 5081-2-3 Telegrams "MorrisTex" Coventry

one centre, but later on as the development proceeds there may be other centres.

DR. S. WERNICK (Honorary Secretary of the Institute of Metal Finishing): The main purpose of the business meeting is to hold a ballot to elect the Committee which is to organise the activities of the Organic Finishing Group. The Committee is to consist of eight members in addition to the President and Secretary of the Institute itself, who will be ex-officio members. In order to extend the scope of the Group's work as widely as possible, nominations have been invited, and have been received, from interested parties who may not be members of the Institute of Metal Finishing at the present moment but will, of course, be expected to become members in the event of the election of their nominees. We have taken rather elaborate measures over the nominations in order that we might have a thoroughly democratic Committee elected today. This Committee will then look after the activities of the Group in an autonomous fashion.

Result of the Ballot

The result of the voting was later announced as follows, eighty-nine ballot papers having been received from about 150 persons present: J. N. T. Adcock 78, H. J. Mason 69, S. J. Scouse 63, J. Dixon 57, A. A. B. Harvey 55, R. L. Yeates 49, W. E. Cattley 46, Dr. W. Stein 44, E. E. Coker 41, Dr. W. F. Coxon 39, W. G. Gill 38, W. S. Field 29, J. H. Ousbey 25, D. D. Wood 24, A. Holmes 6.

Messrs. Adcock, Mason, Scouse, Dixon, Harvey, Yeates and Cattley and Dr. Stein were declared elected.

The President vacated the Chair in favour of Mr. L. O. Kekwick, President of the Oil and Colour Chemists' Association, for the remainder of the meeting.

THE CHAIRMAN (Mr. Kekwick): It is a great honour for me to be asked to take the Chair this afternoon as representing the Oil and Colour Chemists' Association at this inaugural technical meeting of your Organic Finishing Group.

Obviously, you have had the perspicacity to see that there is some ground of mutual interest between the Oil and Colour Chemists' Association and the Institute of Metal Finishing and, as Mr. Cole said at lunch, the Corrosion Group of the S.C.I. and others. In scientific and technological work we find that there are pieces of ground which no institution covers properly, and consequently such a Group as you are forming will obviously do a very good job of work.

I bring to you the best wishes of our Association, and would again like to underline the desirability of your new Group's considering joint meetings with associations such as mine with whom you have common ground. I am sure that the new Committee, which it is apparent will be a very capable one, will consider that possibility.

If it is possible for me to give you a message—it seems rather presumptuous to do so—I took the opportunity at the beginning of my presidency of the Oil and Colour Chemists' Association to suggest that the main aim today is the export of British brains, and after two years in that office I find that I am still of the same opinion. As scientists and technologists, we should appreciate that our job in the world today, and that of our country particularly, is to see that we export British brains. There is no need for me to point out that our raw materials in this country are comparatively negligible—coal, chalk, a bit of iron ore and fresh air, and that is about all—but we have a remarkable reserve of first-class brains if those first-class brains will only make use of themselves and bring themselves out. In order to maintain the standard of living that we have in this country at present and also to increase it, it is clear that we must be one jump technically and scientifically in front of our world competitors. If we can make it four or five jumps ahead, that will be much better.

In a technological institution such as you and I represent, we come right down to industry and science, as Arthur Askey would say, "before your very eyes." There has been a great deal of discussion in the House of Lords and in the Parliamentary and Scientific Committee as to whether

this country is getting the best out of our research institutions, and there is considerable concern whether the scientific work done in this country is quickly enough applied to industrial production so that it can be translated into exports, cash and standards of living. Your Institute with this Organic Finishing Group, my Association and many others are the people who are concerned, and it is up to us to see that the fundamental scientific advances which are made by our friends in the pure scientific world are brought to bear on industrial problems and as soon as possible turned into advances by this country so that—I leave this message with you—we are not only one step in front of our world competitors, but four or five steps in front, as in the case of the Comet.

We will now proceed to the technical business, and I call upon Mr. Harvey to present his paper on "Problems of paint application."

PROBLEMS OF PAINT APPLICATION

By

MR. A. A. B. HARVEY
of Briggs Motor Bodies Ltd.

IN choosing as the title for your inaugural paper "Problems in the Application of Paint," the Organic Finishing Group has rather invited its lecturer to stray at will over the whole field of organic finishing and perhaps to consider some of the problems which we have met in the past, or perhaps to make some rash predictions about what may happen in the future.

As far as the present is concerned—and for the most part those of us who are engaged in the day-to-day work of metal finishing are concerned vitally and primarily with the present—even to present to you a list of problems by name would exhaust the time at my disposal and perhaps also your willingness to listen. But these problems are for the most part extremely practical ones, and it is remarkable that so many of the plants which are put in to apply paint on a large scale owe their inception, at least in broad principle, not so much to people engaged in the theoretical study of problems of application of paint but to the men whose task it is actually to put the paint on. The shop for the most part in my experience has been designed by the men of the shop.

I feel that an inaugural paper should be discursive in nature rather than a detailed discussion of problems that have arisen in the ordinary course of a working life in a factory which applies paint on a very large scale, and I propose to take as the theme of my paper not so much problems of that nature as the problem which a man would have to face were he presented with the question "I want to paint forty, fifty or sixty motor-car bodies an hour with synthetic enamel. Will you provide me with a plant to do it?"

Obviously, with a theme as broad as that I can enunciate not even broad principles. I can only suggest to you how we at Dagenham have tackled that problem in the past. The results which we get are apparent to anybody in the metal finishing industry who takes the trouble—and most of us do—to look at motor-cars in the street. I am always looking at motor-cars, purely out of professional interest. I am always being told by my wife, "Why do you do that? You peer at every motor-car you see. One of these days you will be arrested." Such professional curiosity is, I feel, entirely laudable when I display it, but if people peered into my own car I might feel differently about it.

Another reason for selecting the finishing of motor-cars as my theme is the very good one that it is a subject with which I am more familiar than with any other aspect of metal finishing. It is perhaps the most exacting application of organic finishes that we know. Motor-cars are produced in a relatively

Left to right: Dr. Wernick, Mr. Cole, Mr. Harvey, Mr. Lloyd and Mr. Silman seen comparing notes in the lecture room prior to the start of the meeting

small number of factories in very large numbers. When the car is completed, the finish is viewed very critically both internally by inspection departments and by the owner who has just paid quite a lot of money for an article which he hopes will last him for many years. The problems involved in finishing motor-cars would not be easy of solution even if one could approach them on a "money no object" basis, but cars have to be sold in highly competitive world markets, and the result that we desire of a finish which will be beautiful and durable must be obtained within a stringent limitation as to the amount of money which can be spent.

Today, generally speaking, motor-cars which are produced in large numbers are finished with synthetic enamels, usually of an oil-modified alkyd medium. These require stoving to produce a hard and durable film, the stoving time being normally of the order of one hour at 250° F. In that they differ widely from the pre-war practice of finishing in cellulose or lacquer in that the lacquer film requires merely a relatively short period of air drying. They differ again in the fact that the lacquer film, after it has been force-dried, is normally sanded and polished in order to impart the necessary lustre. The synthetic enamel film is glossy as it leaves the stove, and normally, except for a light polishing treatment to remove finger marks, it gets no further polishing treatment. These differences are, of course, added to by the fact that the rate of film application of a synthetic enamel is very much higher than it is in the case of a lacquer coating. When bodies were finished in cellulose it was necessary to apply the film thickness in two or three coats with a force-drying in between each, whereas the synthetic enamel coat is applied in two wet on wet coats with a slight flash-off time in between. After the second coat, the bodies go into the stove, and that, substantially, is the end of the painting process.

You will appreciate that one implication of passing out the paint film without further polishing treatment is that the paint must be applied in an atmosphere which is free from dirt and that at all times while the film is still plastic and capable of picking up foreign bodies it must be kept in such an atmosphere. It is not too much to say that in order to produce a synthetic enamel job of the standard required for the modern motor-car, the whole of the finishing operation must be carried out in an atmosphere which approaches absolute cleanliness. Particles of dirt which are themselves too small to be seen may be the origin of blemishes which are only too painfully visible. The paint film flows during the first part of the spraying application, and there is a considerable secondary flow during the stoving process. Even minute particles of dust act as a dam to that flow and build up a visible blemish very much larger than the particle of origin.

Since this is the case, any plant which is spraying bodies in synthetic enamel must be equipped with adequate air cleaning apparatus and a sufficient volume of air has to be introduced into the spraying plant to remove the over-spray and to maintain reasonable work-

MICA

Micafine mica powders are now readily available for use in the compounding of paints and specialised industrial finishes.

★

Our mica powders give added protection against corrosion, and assist in preventing disintegration of surface coatings at elevated temperatures.

★ ★

Other important properties include their value as anti-settling agents where heavy pigments are present, and as additives to such metallic pigments as aluminium and bronze.

★ ★ ★

micafine

THE HALL-MARK OF PURITY IN WET-GROUND MICA-POWDER

Write for full details to:

MICAFINE LIMITED · RAYNESWAY · DERBY

Telephone: Derby 55981 (2 lines) Telegrams : "Micafine, Derby"

ing conditions. In any industrial area this in itself constitutes a major problem. If one exposes greased plates outside the average motor body works, an examination of the grease film after a very short time will yield a sample of almost every possible sort of contamination—textile debris, road dust and metal particles, indeed the whole gamut of debris that is produced by the wear and tear of an industrial civilisation. All this has to be removed before the air is fit to be put into a modern spray plant.

The normal method of cleansing is to pass the air first through an oil filter, a honeycombed, cellular arrangement containing a film of viscose non-drying oil. After that, the air is water-washed. It is then conditioned for humidity and temperature. Finally, as a last precaution it is not unusual to pass the ventilating air through a bank of electrostatic precipitators, which removes the final and finest dust particles. The volume of air involved in the treatment is large. My own company, which is producing about fifty bodies an hour, finds it necessary to introduce nearly a quarter of a million cubic feet of clean conditioned air into our spray booths every minute. This not only ventilates the booth but also helps to maintain a slight positive pressure so that the tendency is for clean air to leak out of the spraying zone rather than for dirty air to be drawn in.

These problems of the ventilation of the spray-booth are very real. Even under ideal conditions, paint spraying is not always among the more pleasant of jobs, and unless the ventilation is good, the spray men are apt to be discontented with their conditions of work and, naturally, under bad conditions they will not work as well. Much of the quality, not only from the purely technical aspect but also from the human aspect, depends on adequate ventilation.

Today we also find that the introduction of new raw materials into the paint industry has had some odd effects. Many of these raw materials are extremely active surface agents and have a marked effect on the surface tension of the film. Very often the over-spray of one paint upon another may produce cratering and pin-holes in the paint film.

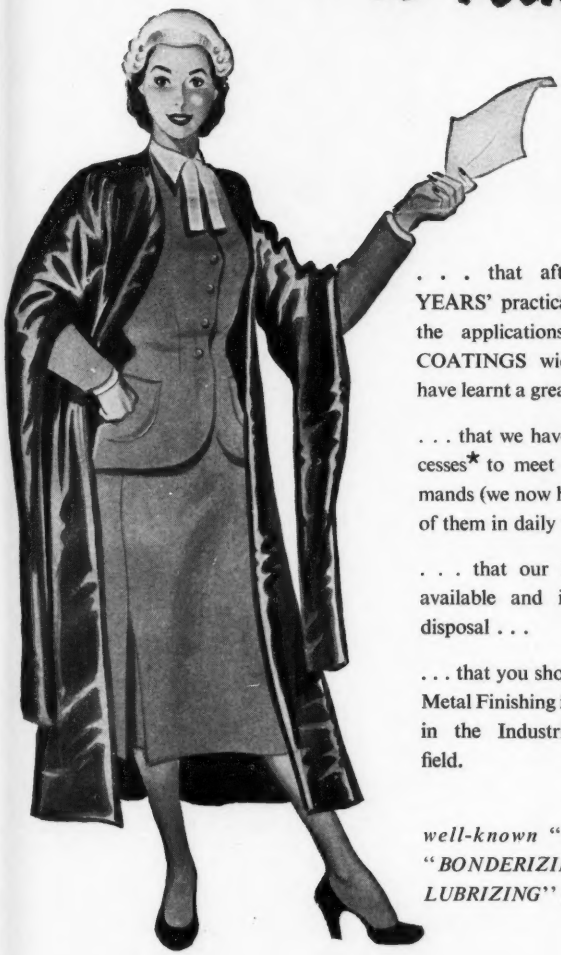
Normally, if the ventilation in the spray-booth is sufficiently good, it is possible to process different parts at the same time. We do not make any attempt to batch colours at all. We put them through in the order in which we should like to see them come off the end of the production line. As a rule we can do that without being troubled by spots of off-colour from one body to another, but we have latterly found that paints which have been modified with the surface active agents have given us a very considerable amount of trouble in this regard and it is only by increased ventilation and very detailed attention to the way in which air is introduced into the spray-booth that we have been able to avoid these troubles.

Since the majority of the firms using large quantities of paint buy their paint from different manufacturers, there is the possibility of a number of materials being subject to quite disconnected variation, and we have found it necessary to check every batch of paint that comes into the works against every other material in the system. If you draw up a chart to cover the complete ramifications of such a testing system, it looks not so much like a guide to scientific work as an attempt to scoop the penny points pool. Everything has to be cross-checked and combined with every other material in the system.

So far, it may appear to you that I have started at the back end, having begun with the finishing coats. That is not entirely out of place, since it is the nature of the finishing coat, whether it be the stoving coat or the air-drying coat, which very largely determines the nature of the system.

I should now like to go back to the beginning, to the pretreatment of metal before it goes into the paint shop. Ideally, one should go further back than that. Many of the problems in the paint shop have their origin in the drawing office, and we have all seen articles which have been produced for painting design and have been sent down to the paint shop where it has proved very nearly impossible to do anything with them. Perhaps they are of such a shape that they cannot easily be dipped and cannot economically be sprayed. Often they are required to be painted to a very high standard of finish, and yet they are full of recesses and other re-entrant portions which render spraying extremely difficult. These problems should be ironed out before the final design of any article is decided upon.

It stands to reason...



. . . that after TWENTY-FIVE YEARS' practical EXPERIENCE of the applications of PHOSPHATE COATINGS widely in industry we have learnt a great deal about them . . .

. . . that we have developed new Processes* to meet fresh production demands (we now have TWENTY-TWO of them in daily use) . . .

. . . that our knowledge is readily available and immediately at your disposal . . .

. . . that you should consult us on any Metal Finishing interests you may have in the Industrial PHOSPHATING field.

**in, of course, our well-known "PARKERIZING", "BONDERIZING" and "PARCOLUBRIZING" ranges.*

THE PYRENE COMPANY LIMITED — METAL FINISHING DIVISION
Great West Road, Brentford, Middlesex.
Telephone : EALING 3444.

As I said before, painting is the final process in many industrial applications and, therefore, it very often has to carry the accumulated sum of the defects which arise from all the other portions of the factory process. It is absolutely necessary that any article to be painted shall be scrupulously clean, and the practice in modern motor-car finishing is to ensure that cleanliness by means of a phosphate coating. The purpose of a phosphate coating in this application is two-fold. Even if it produced no enhanced corrosion resistance, many of us in the motor industry feel that the extra cost of phosphate coating would still be worth while if one regarded it purely as an inspection tool. When it is complete, it shows up by incomplete conversion any areas of grease or dirt missed in the cleaning. It also has the advantage that once you have committed yourself to phosphate pretreatment you have also committed yourself to adequate precleaning.

It is true that all this is very much more expensive than the old hit-or-miss method of scrubbing with phosphoric acid solution and a lump of wire wool. The cost of a modern mechanical phosphating system is fairly high, and when an equitable portion of that cost is added to the cost of finishing, obviously the price must go up, but, on the other hand, I think everybody would feel that the increased factor of safety which is gained and the freedom from complaints by the user fully justify that cost. One of the problems encountered by the technical men in industry is the assessment of imponderables of that nature which has to be made when deciding to install clean processes of this type. It is often difficult to put over such things which cannot be weighed in terms of money, speed of production or any of the other usual criteria applied when putting in a plant. To try to put over the idea that this system, which is going to cost some money, is an adequate safeguard is very often not too easy.

I have said that the phosphating of surfaces would be worth while even if no enhanced corrosion resistance were obtained, but all the evidence, of both accelerated weathering and long-stage natural weathering, clearly shows that such enhanced corrosion resistance is in fact obtained.

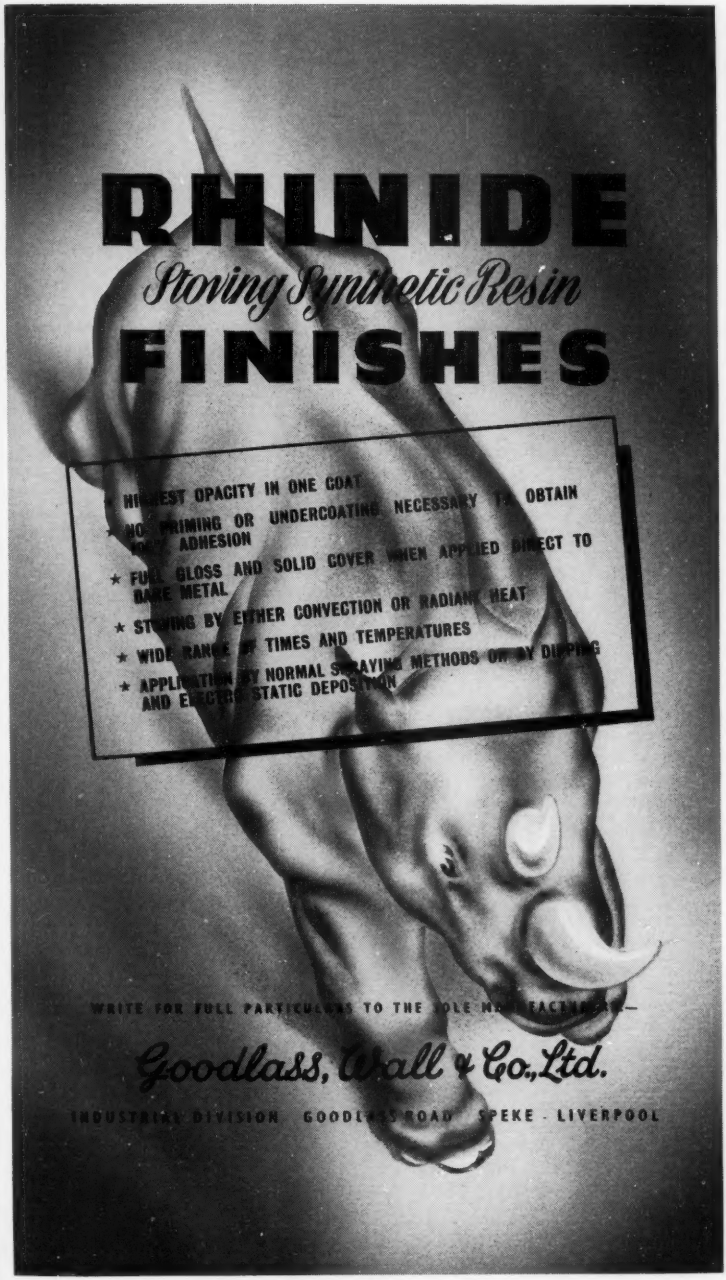
A typical spray-phosphating unit for sheet metal parts consists of a series of tanks, each with its own pumping system supplying the cleaning and phosphating solutions from header pipes into the processing tunnel above. There are six stages: an alkali cleanser; a water wash; another water wash; the phosphating solution; another water wash; and a chromate rinse. Following the chromate rinse, there comes a drying-off oven, and the parts emerge at the far end completely phosphated and dried.

An alternative method of phosphating for the motor-car industry is the dip process, which is carried out in large "Rotodip" machines, largely designed by the Carrier Motor Engineering Company. These work on essentially the same principle except that instead of there being a uniform spray process, complete motor-car bodies are immersed in the tanks of processing solution and then rise through the spray zone. In such a plant the body is loaded on a spit and passes through the emulsion cleaning, first rinse, second rinse, phosphating, third rinse and the chromatic acid, followed by a dry-off.

One big, very valuable feature of these plants is that the phosphating process is immediately followed by a primer dip. The body is immersed in a tank of primer and then stoved. During all these processes the body is not only traversed through the plant up a straight line by the conveyor chain but is also rotated on its axis so that draining is complete and uniform over all surfaces.

After phosphating, a motor-car body is usually given a coat of primer. In the Rotodip plant the priming is done automatically by dipping. Many manufacturers use either a coat of primer or two coats of primer surfacer, a composite material which combines the corrosion resistance and adhesion of a primer with some of the filling qualities of a surfacer. Normally when a primer is used, it is followed by two coats of a heavily pigmented surfacer.

After the priming coat has been applied, a motor-car body is normally stoved for one hour at a temperature of the order of 300° F. This stoving process is probably the key to the whole painting system. Unless the primer is well cured it cannot be properly sanded so that there is a loss in appearance and, also, it will not hold up the colour coats


RHINIDE
Stoving Synthetic Resin
FINISHES
★ HIGHEST OPACITY IN ONE COAT
★ NO PRIMING OR UNDERCOATING NECESSARY TO OBTAIN
ADHESION
★ FULL GLOSS AND SOLID COVER WHEN APPLIED DIRECT TO
BARE METAL
★ STOVING BY EITHER CONVECTION OR RADIANT HEAT
★ WIDE RANGE OF TIMES AND TEMPERATURES
★ APPLICATION BY NORMAL SPRAYING METHODS OR BY DIPPING
AND ELECTRO STATIC DEPOSITION
WRITE FOR FULL PARTICULARS TO THE SOLE MANUFACTURERS—
Goodlass, Wall & Co., Ltd.
INDUSTRIAL DIVISION GOODLASS ROAD SPEKE · LIVERPOOL

but will sink and readily lose lustre and tend to craze.

Sanding the primer sounds simple, as if you get a piece of sandpaper, wet it and rub it over the body. But it is not so simple. It has to be done against the clock. You are producing forty or fifty bodies an hour and most of the production sequence has to be speeded up for plants would otherwise become unwieldy in size, and, unless it is properly supervised, the tendency in rapid sanding is to cut through the priming coat, and that has to be repaired at a subsequent stage in painting.

Typical sanding operations in the motor-car industry involve use of sanding machines hung from a counterbalance. These machines have to be used with very great care and there has to be very great inspection coverage for they are otherwise liable to do a certain amount of damage, but they are essential if speedy production is to be maintained.

With reference to the sanding deck, there is an absolute necessity to remove all the debris after sanding is completed. After sanding in our own plant, the bodies pass through a series of water sprays across the sanding deck and after a copious wash with the sprays they are brushed with hand brushes also supplied with water, and the brush process is followed by leathering to remove the last traces of water before the bodies go into the drying-off oven. If water is left on, particularly in this part of England, where the water is so hard, there is a tendency for lime rings to be produced and rapid breakdown of the paint film may result. In practice, we find that a swabbing over with a chamois leather cloth removes the vast bulk of the water, leaving only a film to be evaporated in the oven.

In many plants after the priming and primer surfacer coats have been applied, a sealer coat is added, this usually being of a synthetic enamel material rather more heavily pigmented than the normal body finishing material, and it is sprayed and sanded as before, but finer sanding paper is used.

Both stoving processes are carried out in tunnel ovens. Normally the stoving duration is about 1 hour at a temperature of about 300° F. These ovens are usually heated by gas convection plants. After a good deal of experimental work on the actual plant stage, we have found that convector ovens of this type, in which the gas is burnt in a separate furnace and the products of combustion are forced into the oven along ducts at the top, are very useful. They are free from trouble and can be depended upon to give uniform temperatures anywhere up to 400 or 500° F. They are not so useful for stoving finishing coats and are seldom used for that purpose as the control of temperature in a recirculating gas oven of that type is probably not accurate enough to stove a modern finish in one of the light pastel shades which are now so often employed in the motor-car industry.

For the final colour coat, the tendency is to use the universal steam-heated tunnel oven, and the paint is designed to stove out in 1 hour at 240-250° F. This gives very good colour stability, and we find that bodies sprayed in one plant can be accurately matched with wings and other small parts sprayed in another. I do not think that any system of heating other than the steam-heating tunnel would permit such accurate control of colour.

One of the problems in spraying motor-car bodies is the disposal of the over-spray, which may amount to 40 per cent. or more of the total paint which is sprayed. The normal system of down-draught booths, in which clean air is introduced at the top of the booth and swept downwards to a water trough below, is fairly adequate to this purpose. After the air passes over the water trough at the bottom of the booth, it passes through scrubbers where the pigment and resin residues are washed out. These are subsequently scrubbed off the baffles and disposed of.

One method which has been devised to overcome the problem of over-spray is the Ransburgh No. 2 electrostatic spray, which has not yet come into wide industrial application into this country. The original No. 1 process in which a strong electrostatic field was used to deflect the paint on to the article to be painted is fairly well known. The new process goes one further in that it uses an electrostatic field to patternise the paint, so that it dispenses with the ordinary orthodox spray-gun with compressed air for atomising it. The work is hung on a conveyor, which is earthed, and passes in front of the rotating guns which are charged to a potential of

PRODUCTION PROVED PRODUCTS

SUNBEAM ANTI-CORROSIVES

SPECIALISTS IN INTERMEDIATE METAL FINISHING

Manufacturers of

STRIPALENE Regd. — For the removal of paints, carbon, and other contaminating deposits

FERROCLENE Regd. — A most effective rust and scale remover for ferrous metals, including stainless steel, supplied in different grades

ALOCLENE Regd. — Acid cleaner for removing oxide films from aluminium components prior to spot welding.

FERROMEDE Regd. — For the de-watering and protection of metal parts during processing or storage

There are various grades of each of the above products available to meet all technical requirements and comply with Government specifications.

SUNBEAM ANTI-CORROSIVES
LIMITED

CENTRAL WORKS : CENTRAL AVENUE
WEST MOLESEY : SURREY

Telephone: Molesey 4484 (5 lines)
'Grams: Sunanticor, East Molesey

about 150,000 volts. The paint is carefully metered into the gun and it is driven by centrifugal force up to the edge of the electrostatic field which exists between the work and the edge of the gun, and this is sufficient to tear the paint off in fine particles and deflect it on to the work to be covered. The coverage is claimed to be about 90 per cent. of the paint sprayed, and the consequence is that problems of over-spray hardly arise.

The process has not yet been used in the spraying of complete motor-car bodies but it is used extensively in America for the spraying of detail parts, such as wings, bonnet tops and similar items, with very great success. Since the compressed air which has to be supplied to the spray-booth in large quantities for atomising the paint is costly and a prolific source of trouble, any device which does away with the use of compressed air would be very welcome.

Several problems arise where a large number of colours are applied simultaneously in a plant. The less the spray men have to do other than spraying the better. A spray man should be able at all times to pick up a gun and spray, knowing that the paint is of the correct spraying viscosity, has been blended correctly with the right thinners and is correct for colour, matching previous batches. This is much facilitated by the installation of a separate central mixing room where all the paint for the production is mixed by a paint mixer whose one job is to keep the room running. Such a man has no responsibility for spraying. Equally the spray men have no responsibility for paint mixing or seeing that the supply of paint is maintained. Open cannisters are used in some plants and, in these, paint is picked up from the bottom by means of a centrifugal pump and pumped round the centre, returning by means of an inflow return pipe. Colour pipes run along the wall of the finishing booth, and they are fitted at intervals with nipples to which the spray guns are fitted. Except for a relatively small amount of paint which is in the deadline from the draw-off cock to the gun, the 40 or 50 gallons of paint in the plant, plus 20 gallons in the pipe run, are in continuous circulation. Fresh paint is added as required through funnels, being strained through cheesecloth.

A preliminary mixing is carried out in a special room and gravity feed into the vessels is required, so that at any time there is roughly 180 gallons of mixed paint in the system, and the quantity of paint involved in this helps to cushion the unavoidable drift in colour one way or the other from batch to batch. Any colour change is comparatively slow because each batch is diluted with a considerable volume of its predecessor.

We now come to the final stage. The inspection line; at Briggs's plant at Dagenham, which I have tried to describe, the cars come out of the oven at one end, go through a cooling booth, round a horseshoe track and then come up for trimming. They are carefully inspected. Any dents are knocked out by "ding-men," and any requiring refinishing are taken off at the end and put back into the system at the sealer coat stage where they are completely sanded down, the defective top coat being removed, and they then pass through the system in the normal way again.

Very intense illumination is provided, four banks of fluorescent lighting supplying the horseshoe track. There are also temperature recorders on the final finishing ovens. The keeping of accurate records is a characteristic of the whole of the body finishing process. On the phosphating plant the operator takes a check of each tank every hour, and that is carefully logged, from time to time during the day a member of the laboratory staff comes round and takes an independent check and looks at the log book to see how things are going, and at rather less frequent intervals—about once a week—a complete analysis is made of every tank in the phosphating system. It is only by means of rigorous control such as this that a plant dealing with forty to fifty bodies an hour can be kept turning over with the minimum of trouble.

I have said nothing so far, and I cannot in view of the time, about the control which is necessary to ensure that paint which is supplied to such a plant is uniform. The modern large-production plant, with mechanical handling, fixed conveyor speeds, fixed times of operation and fixed temperature, is a rather inflexible production unit, and in order that it may continue to run the tolerances on the raw mate-

rials supplied to it must of necessity be small. I feel that one of the topics which your new Committee might consider for papers in the future is simply this question of control of incoming raw materials to plants such as these which are large users of paint and which require, among other things, very accurate colour matching from batch to batch. We have been able to hold our colour to such an extent that wings sprayed today may be put into store and applied to bodies which will be sprayed in a week or ten days' time and be a very reasonable colour match. To keep to that standard requires rigorous control on the part of the user and on the part of the paint maker. This might also form an interesting topic for papers to this Group from both sides of the industry.

Discussion

Mr. WILSON: Might I say, as a paint supplier, how much we appreciate what the lecturer has told us. It is very valuable to see the user's point of view upon these matters, and I think Mr. Harvey has shown his side of the picture very well.

I was very much impressed with his description of the pretreatment process and the care that is taken with the surfacing of metal before any attempt is made at painting. So many people go wrong and then blame the paint for all sorts of things. I suppose the most important factor is that they do not take care of the surface to start with. I am glad to see that Briggs's have taken great care about that.

What does Mr. Harvey do with his paint circulating system on the occasions when the plant is shut down? Does he drain the pipes, or does he keep the circulating system going?

Mr. HARVEY: The only time the plant is shut down is at week-ends and during the statutory holidays and during the fortnight's shut-down during August, but throughout these periods the circulation is maintained. One or more tanks might be taken out for cleaning. Normally, we should expect to be able to pump the paint round for a fortnight in a closed system such as this without deterioration. We fill up and then remove the filling funnel and put on a screw cap, and thus there are only a few inches of air between the cap and the surface of the paint in the inlet to the system. The return pipe is often lengthened to dip into the tank in order to avoid aeration. Except for reaction by metallic pigment in the medium, we have had no trouble.

A QUESTIONER: With reference to the washing-off after sanding, has Mr. Harvey thought of using demineralising water? What would be the economics of doing that? Would it pay to take the lime salts out of the water? Would it save him more in process costs than leathering does, or not?

Mr. HARVEY: Our plant engineering department have investigated the economics of both using a concentrate and using demineralised water, and in both cases the results are very bad. The volumes of water are enormous. There are not only the banks of sprays; on each body you have four men equipped with ordinary car washing brushes using water. I do not know what the amount of water per body is, but it is certainly very great. We find that a good draining followed by a leathering operation reduces the danger of lime contamination to negligible proportions. We have not for a very long time had any trouble which is directly attributable to hard water drying on the body.

Mr. G. H. COX: You spoke of trouble with the air supply to the spray-guns. Can you illustrate that and give us some details of the sort of trouble that you experience with the air supply?

Mr. HARVEY: In compressing air, you take in ordinary atmospheric air, clean it to the best of your ability, compress it and then pump it round the plant. There are a number of sources of contamination. There is the possibility of there being water in the air. There is the possibility of oil derived from the compressors. These problems are normally dealt with by passing the air into large receivers which also serve to cool the air—it is heated by compression—and these allow the particles of oil and water to settle. Each gun is fitted with a filter, and there are filters at various stages in the compressed air system. In some cases we use stoneware bottles and ceramic filters. Generally speaking, the troubles are oil and water in the air, and very often where steel or gal-

vanized iron piping is used for conveying the air, rust due to a breakdown of the interior surface of the pipe causes trouble. The latter trouble is apt to occur during shut-down periods when there is no movement of air in the pipe and water is deposited; when you start up again, the first thing that comes out of the guns is a stream of rust particles.

Otherwise compressed air is not troublesome. If conditions are right, you are all right, but if you get trouble with compressed air it may take a long time to cure it because the whole of the system has to be purged until it is free from whatever contaminants may be necessary. The major drawback to compressed air is its cost. It is an expensive article of consumption, and one which is wastefully used, as any person who has any connection with an industrial plant will confirm. People turn on the compressed air cock and then walk away and leave it running. They are all under the impression that air is free.

Dr. CLARK: I was not clear how the paint was applied. Are the sprays operated by hand or are they fixed at various vantage points so that the car body is automatically sprayed without any hand application?

Mr. HARVEY: Both systems are fairly widely employed. As far as I know, car bodies are not completely automatically sprayed anywhere. The shape is rather complex for automatic spraying. Also, most body manufacturers have more than one model passing along a line, and consequently automatic spraying is not sufficiently flexible for complete body spraying. Usually the body is mounted on a skid and it is pulled along by a floor conveyor engaging with dogs on the skid. It passes through a tunnel spray-booth and is sprayed continuously from both sides. Some companies have adopted the Rotospray, with which the body is mounted on a spit similar to the one you saw on the Rotodip slide, and as each surface is sprayed the spit is turned through an angle sufficient to bring a new surface to the spraygun. In that case, spraying is from one side only. Broadly speaking, all motor-car bodies are sprayed by hand and the vast majority of small parts are still sprayed by hand. Electrostatic spraying, which is normally automatic, is used for wheels and a number of small parts in small plants. The practice varies considerably from factory to factory.

Mr. ISAACS: Is the paint heated before spraying, and is there any merit in heating the paint?

Mr. HARVEY: No. My company has done no work on hot spraying at all. The paint is sprayed at room temperature. We normally keep the booth at about 70-75° F.

Mr. GREGG: Mr. Harvey spoke about the value of the phosphating treatment before painting and also mentioned that during the sanding of the primers one can sometimes go through the coating. I assume that if that is so the phosphate film is destroyed. What is the reaction in such cases? If the phosphating treatment is really necessary, is the job treated again as a whole, which may be extravagant, or is it dealt with locally? What does Mr. Harvey recommend should be done in practice to deal with cases like that? Does he find that kind of trouble a relatively frequent or infrequent occurrence?

Mr. HARVEY: Cutting through the primer is not a desirable feature. It is something which is avoided as far as possible. How do we cope with it? The only possible practical solution is to recoat with primer. I do not think it would be practicable to put the body right through the phosphating system again. The number of bodies with the primer cut through is kept to the minimum by rigorous inspection. Fortunately, the places at which the primer is likely to be cut through during the sanding operation are not those which are exposed to damage on the road. Wings are the most vulnerable points, and they are very often extremely lightly sanded. In many cases, wings are finished with two or more dip coats and are not sanded, or are given no more than a light rub which would never cut them through. The tendency is for the primer to be cut through on the edges of doors, and in that case we patch with primer; but we make no attempt to rephosphate such parts. I do not think it would be practicable to do so. I do not think anybody else in the industry does do so; if they do, it is something that I have not heard of.

Mr. PAKEMAN: We have heard

references to stoving at fairly long periods at fairly low temperatures. With the production rate they have to handle, I am sure that Briggs, must have considered a shorter period of stoving at higher temperatures, as, for instance, in the case of exposure to infra-red heating.

Mr. HARVEY: Motor-car body construction invariably uses a certain amount of soft solder for body patching and levelling off of joints, and that puts a top limit to the temperature of 320-325° F. If you go above that, you will be approaching the melting point of solder, and bumping over conveyor joints is likely to crack the solder. With an oven at 320° F., if the body stops with a solder patch under the ducting introducing the hot air, you are likely to get a run.

Infra-red stoving is one of the things that the industry has—I was almost going to say "played with." It is again a matter of complex shape and of putting a variety of articles along one production line. At Dagenham we stove a lot of small parts in a gas-infra-red tunnel but they are normally almost flat articles and ideally adapted to radiant stoving. We have not done anything of that nature with motor-car bodies. The original application of infra-red was to motor-car stoving by Henry Ford with the elaborate arrangement of the clam shell which surrounded the body and travelled with it, but even he has dropped it now and the tendency is to use more high velocity convection ovens in which a high proportion of the heating is by radiation.

Dr. WERNICK: I am interested in the Rotodip method of processing. Could Mr. Harvey give us his views about the relative merits of that method of coating a car body as compared with the spray method? It is claimed for the Rotodip method that it succeeds in reaching every part of the body. Is it right to assume from that that the spray method, which has many advantages, does not do that? Is it felt that that method is adequate to treat a complex shape like a car body?

There is another matter on which I should like a little information. Some time ago I was privileged to look round Briggs's works, and Mr. Harvey was then doing some rather interesting

37 DIFFERENT PROCESSES

also many other special ones for

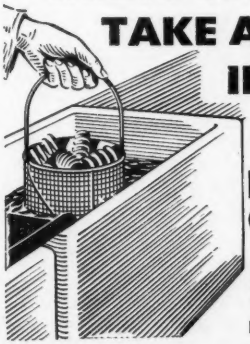
PROTECTION TREATMENT & COLOURING

of METALS and METAL COMPONENTS by

CHEMICAL IMMERSION

In every industry from shipbuilding and machine tools, etc., to jewellery manufacture . . . from farm implements to motor cars . . . many thousands of satisfied clients confirm that "M.P." processing gives better protection, finer finishes, far longer service and is the cheapest to use—a reputation that is backed by 21 YEARS OF INTENSIVE EXPERIENCE and RESEARCH

1. We can supply you within a few days with metal processing equipment in your own works.
2. We supply the chemical process materials for existing plants, ex-stock.
3. We give free service to customers.
4. We can black process your steel parts in our own and also in our "Outworkers" Works.



TAKE A DIP INTO

Stand **D.229** (Engineering Section)

B.I.F. Birmingham

Metal Processes LTD

Founded 1932

On Admiralty, War Office and Ministry of Supply lists.

758-786, KINGSBURY ROAD, ERDINGTON, BIRMINGHAM, 24

ERDington 0435 & 0432.

work in connection with centrifuging sludge, with which we are all afflicted when we have to use any type of phosphating process. It seemed to be a very interesting method of dealing with the problem. Can he tell us what has happened about that development? Has he anything of interest to tell us about its progress?

Mr. Harvey: "Dip phosphating or spray phosphating?" I take to be the issue in the first part of the question. I have only had experience in running a phosphating plant for motor-car bodies by the spray method. It is very difficult to make a comparison between the two processes unless one has run them side by side on the same article. To begin with, I ought to point out that if you are going to operate any phosphating process, that factor has to be borne in mind when you are designing the body that you are going to treat. It is no good designing a body which cannot be pretreated before phosphating and will not be treated in a spray phosphating process. To that extent, I can only say that with our own bodies, which were designed with a spray phosphating process in mind, it has proved satisfactory. Perhaps it is easier to control, but I cannot speak about that as a result of any direct practical experience. Spray phosphating plants have proved their worth both in this country and in the United States. So far as I know, no dip phosphating of motor-car bodies at all is being done in the United States. I know that Briggs Manufacturing in the United States have been spray phosphating now for 25 years or more, and they are still doing it. We have been running a phosphating plant here for three or four years. We have had no complaints from the field about the breakdown of parts which have not been phosphated. There is no difference in the breakdown position between phosphated areas and areas not pretreated b e f o r e being put through the plant, but, on the other hand, we make sure by using high bake coatings, and our chassis are stoved for half-an-hour at 400° F., so that we get adequate protection in other ways.

We have tried sludge removal by means of centrifuging. We find that the major difficulty is probably one which is peculiar to our own plant. The process tanks of our body plant are very shallow in comparison with their volume; they are large area shallow tanks. That is because the factory is several feet below sea level, and if you dig a hole there is often a debate as to whether it is more economical to put the plant in or to let the fish in. The consequence is that we have a very bad condition for sludge removal by centrifuging because there is such a small depth in which the sludge can settle before it hits the bottom, and once it has hit the bottom it is almost impossible to pick it up by means of a centrifuge pick-up pipe. Air agitation is not practicable because there is little rest. The centrifuge runs continuously, and it takes out a fair amount of sludge. The liquor, which is often heavily sludge contaminated, comes out clean. The centrifuge has been running for two years practically night and day, and it has done extremely well. Mechanical breakdowns and corrosive wear have been very small. I should say that in the case of a plant designed with sludge removal by centrifuge in view, it would be extremely good. Our plant was designed before the centrifuge was introduced.

Mr. WILLIAMS: I cannot agree with Mr. Harvey that motor-car manufacturers have "played" with infra-red stoving. I have experience of infra-red on the electrical side, using elements which have enabled one motor - car manufacturer to operate a number of such plants for several applications, one for drying off and another for drying off spot spray, and I have actually stoved primer on a complete body. With these ovens, it is possible to build up to stoving temperature and to keep them at a holding temperature below that.

Mr. HARVEY: I agree. My remark was far too sweeping. Unquestionably, radiant drying is used extensively for spot drying. We use it ourselves to some extent; we use it for small parts quite extensively. Nevertheless, my company does not use it for body finishing, in either the priming or the colour finishing stages. I said that I did not know of any extensive use of it for body work in any part of the world. It was purely a limitation on my personal knowledge.

PROBLEMS OF DIP AND SPRAY PAINTING

by

MR. D. H. LLOYD

of Fisher and Ludlow Ltd.

DIPPING and spraying are by far the most important methods of applying paints in the metal industry, and I propose to interpret the title of my subject as a description of the essential differences between these two processes and a list of the factors which affect the choice of a dipping or spraying operation. At the same time, these factors are modified to some extent when we go on to large-scale plants.

Regarding the mechanism of the two processes, I feel—although I may be corrected on this point—that we still need to learn quite a lot about it, but some general idea of it helps us in the design of control systems and some comment on that may be of interest to you. Also, the influence of product design is of very great importance, particularly in the case of dipping. This is a very important factor, because, as I shall try to show you, dipping is usually cheaper than spraying. Certainly, it is basically a cheaper process to operate.

Even small dip tanks are not portable—one has to take the work to the tank, and even in the case of the smallest tanks that is true—whereas a spraying plant in its simplest form can be made portable and taken to the work. That is one basic difference between the two processes. Unfortunately, one cannot generalise too easily; you fall into a certain number of pitfalls if you do. As an example, there was an American company which recently described the way they painted a large gas holder. They poured the paint on top of the water seal and allowed the gas holder to dip paint itself in the normal course of operation. That is a case where a dip process was taken to the work. On the other side of the picture, although a spray plant can be portable in a simple form, very large production units are very involved, and that is just as large a factor as in the case of a dip plant.

In many smaller factories there will very often be a spray plant already installed, and in such cases there is a natural tendency to use the plant which is available despite the theoretical advantages of a rival process. This can apply to both types of plant. For example, if an automatic dipping plant has a few spare hooks, it is a temptation to hang something on them and get the job over. This applies particularly in the case of a spray plant because it lends itself more readily to the application of a complete system and not only just one or two of the earlier coats. But when these factors are not the primary ones, there are certain pros and cons to be considered before a decision is made.

Dipping is the simpler of the two processes. It consists of a tank, a suspending hook and facilities for draining. On the other hand, spraying is dependent on the use of an intricate mechanism for atomising the stream of liquid paint, usually with compressed air, and in its simplest form it needs more elaborate equipment than dipping, and it is also very dependent on the manual dexterity of the operator.

It is necessary to spend a certain amount of time designing the exact way to hang the job for dipping in order to get an efficient draining. If a pocket of paint has to be left we must arrange that it is the minimum and that it is in some part that does not matter very much.

In addition to the advantages of dipping which I have already mentioned, it is usually easy to mechanise.

As we have already seen, the operator does not usually have to have very much skill. Awkward shapes and complex fabricated structures are easily painted inside and out. In many cases, structures which would be impossible to spray can be coated with paint fairly easily by dipping. Within reason we can say that any job which can be handled can normally be painted by dipping.

Another advantage of a dip plant is that it can be lined up with a continuous phosphating and pre-treatment plant rather more easily than in the case of a spray plant. The Roto-dip plant, for example, is one complete unit, and the dip tank lines up very nicely when the complete job is done, giving a dip primed body at the end.

A disadvantage of dipping is that it is quite difficult to produce a coat of paint with a perfect finish, particularly the very high standard of finish that we need for final coats on motor-car bodies. I do not know of any example of a motor body being completely finished in the final colour by dipping for that very reason. Another disadvantage is that many fabricated structures retain pockets of paint in the process of dipping, and for their complete elimination more than one draining angle is required, and that makes the elimination an expensive business. Obviously, if you cannot get rid of your pockets of paint by means of a straightforward jig you have to have some mechanical movement, either rotation or dipping, in order to get rid of them. Sometimes this is done simply by putting a bumper bar under the paint surface, by means of which the work is pulled and turned round in the right angle for dipping.

Another disadvantage of dipping, and probably one of the principal ones, is that it is inflexible as regards colour changes. If you want to change a colour you have to change the paint in the tank, or you have to have more than one tank, which is a very messy business.

A paint tank required for the dipping of a car body has to be a very large tank, one of about 6,000 gal. This illustrates that the amount of paint in use is determined by the size of the work rather than by the output.

Moreover, in the case of dipping, there is the draining operation which does not occur with spraying. It is a time-consuming operation which may last 10-15 min. It occupies time and conveyor length, and this does not occur in a corresponding manner with spraying.

In the case of spraying, the amount of paint in process may sometimes be as small as a pint. On the other hand, a number of large mixing tanks would be needed for a motor-car spray line. Nevertheless, the amount of paint in process rarely exceeds 50 gal., or 100 gal. at the most; and this volume of paint is determined not by the size of the article, but by the consumption of paint and the necessity for replenishing. In a plant of this type the paint is replenished fairly regularly and, as it is in the circuit for only a comparatively short time, the paint does not suffer from deterioration, as is very often the experience with a dip tank.

In a simple spray booth, colour changes can be accommodated by means of a series of pressure pumps and spray guns without the need, as in the dip method of a line of immovable tanks with a considerable amount of engineering work attached to them. If one colour goes out of action for any reason the pump can be kept out of contact with the air, and the paint deterioration is far slower than in the case of a corresponding dip tank.

One of the disadvantages of spraying is that, depending on the type of work, you can lose anything up to 40 per cent. of the paint which passes into the gun. Some spray goes on the work, but quite a lot goes into the exhaust system.

You can eliminate some of the disadvantages of dipping by means of a controlled rate of withdrawal, actually by withdrawing the paint tank from the work rather than the other way round. Whichever way it is done, the controlled rate of withdrawal must relate to a symmetrical shape. In order to take full advantage of that method of dipping, before finalising the design of any article it is essential to consider how it will be painted. It is obvious that much good can be done in redesigning an article for a dipping process since, as I mentioned, a dipping process is usually a cheaper way of finishing it.

A number of developments for avoiding some of the disadvantages of spraying were mentioned earlier, including the hot spray system. Among the advantages of this system are that you spray paint with much higher total solids, you have less solvent to exhaust and there is a saving in paint because the guns are generally a little nearer the work and so there is rather less over-spray. One of the principal advantages from the point of view of the motor industry is that one sprayer can put on more paint in a limited time.

Spraying is a rather difficult process for interiors, but there are a number of fittings and extensions which can be used on the spray gun for special jobs, especially in the case of a large production, which enable you to spray an interior surface. In some cases the extension tip is very long and is mechanised, which enables you to spray the inside of long tubes. A number of jobs of that type can be done, particularly in cases where dipping is difficult. It is also possible to spray two colours on the same article on two surfaces. You can paint the inside of a tube with a corrosion-resistant compound in liquid form and also paint the outside another colour. This sort of thing would not be possible with a dipping process. In such cases as these the special spray fittings are useful.

To sum up the position, it would probably be true to say that, at any rate in the motor-car industry, the primer coat is nearly always dipped and the surfacer or undercoat is very often dipped, but the car body itself is not usually dipped simply because we do not want surfacer on the inside of the body. The final coat on car bodies is almost invariably sprayed, but on articles of uniform shape which have been designed for dipping, the final coat can also be dipped.

I do not want to talk about paint manufacture at all, but, in order to complete the picture, perhaps I might mention the physical properties of the material. These will range from a hard resin down to quite a liquid material. We start with a manufactured resin pigment, and we mill to just about a coreable paste with a little solvent and oil. At the next process, solvent is added to give a high viscosity paint, and there is probably a second dilution which gives paint as it goes to the user.

On receipt of the paint, the user generally dilutes it somewhat further to a working viscosity. Then he puts it in either the dip tank or the spray circulation line and applies it to the work. The changes which have taken place during manufacture are very nearly reproduced on the surface of the work. We come up from a liquid paint right through all the stages of viscosity development until we get pretty well to the thick paste stage, at which stage the paint does not flow on the work. Then it is oven-baked and finished off, and we end up more or less with the same materials with which we started, with certain chemical changes, spread over the work in a uniform film. It seems a complicated process to get a lump of resin, a bottle of oil and a spoonful of pigment spread over the metal surface, but that is how it is done, and that is how it will continue to be done for a long time.

To digress for a moment, if we can have paint in plastic form—I am still talking of organic finishes—we can spray it and go from one point to the other by-passing all that I have described, but it is interesting to note that in doing so you replace a complicated manufacturing process in large volumes by a rather complex and expensive application process.

To return to paint as the user gets it, there is a point which represents the viscosity when it is applied to the work. The evaporation curve will go up to a hypothetical point at which the paint will have ceased to move bodily. It will still flow and give some benefit in surface finish, but it will not run to the extent of producing runs or sags. If we go above that point we get orange peel effect in spraying, dry spray, and far above that we get to the stage of spraying dry paint, which is paint dust. If the viscosity conditions are below the point indicated, we get runs and sags. It is the essence of good spray painting to maintain the conditions of the paint to ensure that it reaches the work in that state. A good sprayer carries in his mind a rule of thumb picture which probably corresponds to the curve described.

The essential difference between dipping and spraying is that the evaporation occurs on the work surface when dipping, but in airborne droplets between the gun nozzle and the work when spraying. Incidentally, the time factor is very different in the two processes. The droplets have been estimated to be about ·001 millimetre in size and to take about one-hundredth of a second to pass from the gun to the working surface, whereas the dip draining period may be up to 10 min. or more. That is really a vital difference between the dipping and the spraying processes. It means that dipping will nearly always give you a slightly inferior surface. On the other hand, if it is not accurately controlled, spraying is even more liable to give you trouble, but in the hands of a good operator it can give you almost perfect finishes.

A little later on you probably have a surface which may show a slight spray pattern. That is flashed off, and at the beginning of the oven process there is a slight oven flow when the physical properties drop a little and the viscosity is reduced sufficiently not for gross defects to be covered but for the material to flow a little on the surface to produce the high gloss which one gets with a synthetic paint direct from the oven.

Paint is supplied to evaporate more or less in a certain way which is determined so that it shall produce a good job. What we have to do in controlling is to make certain that all the evaporation conditions are constant, and, of course, it is most important to see that the temperature of the booth or the dip tank, the draining temperature, the velocity of the air movement and all the atmospheric conditions connected with the evaporation of solvent are maintained constant.

Another disadvantage from which dipping suffers is that when the paint is agitated and exposed to air, a certain amount of oxidation takes place. The contents of a dip tank will gradually increase in viscosity partly due to evaporation and partly due to oxidation. The way to watch that is to plot the viscosity curve and the total solids curve. If the two curves remain more or less level, all is proceeding fairly well, but if you get a level viscosity curve and a falling total solids curve, it is evident that something serious is happening to the dip tank, and it will become disastrous if you do not do anything about it.

It means that you are not putting in enough new paint to make up for the deterioration in the tank itself. This is one of the most important points in designing the dip tank. You must have the minimum surface area and the minimum volume of paint in the tank to keep the tank working to maximum production and there must be the maximum input of new paint. In that way, the dip tank can be kept in good condition and will give very little trouble; when tanks get out of hand, however, very little can be done about it.

When a dip tank goes out of action for any reason, it is wise, especially in the case of a very big tank, to make arrangements for dropping the paint into a separate storage tank where it is out of contact with the air and can be gently agitated; this arrangement is used in the case of a large-scale plant such as the Rotodip. We have pipe work and arrangements for dropping the paint into the underground storage tank. If gentle agitation is applied, paint can be stored in that way for several weeks.

Discussion

Mr. SHAW: I wish to refer to the possibility of combining a dip process and a spray process by using the flow coating method. This is not necessarily applicable to Mr. Lloyd's plant. I have in mind the principle of using a flow coating plant on a fairly large scale as opposed to dipping. I do not mean tipping a can of paint over an article; I mean the use of a mechanised method, flow coating obtained by means of a plant similar to that used for spray phosphating.

Plant manufacturers would do well to study that type of application, for it would overcome one of the snags pointed out by Mr. Lloyd in the case of the dip tank method in that the materials tended to age, viscosities remained constant and the solids fell. Plant manufacturers and users would do well to consider flow coating with the more modern materials for they would probably be very suitable. A relatively small amount of material is required in the flow coating reservoir,

WATER WASH SPRAY BOOTHS *of* GREATER SIMPLICITY *and* HIGHER EFFICIENCY

There are no pumps, nozzles or filters to choke or need attention. The only moving part is the fan, which handles the clean dry air from the high efficiency wash and discharges it to the atmosphere.

We welcome enquiries for incorporating these advantages in proprietary booths. We can also offer the same advantages of clean exhaust with very little maintenance for DUSTS AND FUMES FROM POLISHING, GRINDING AND PLATING

DRUMMOND PATENTS (HOLDINGS) LTD

5 GREAT WINCHESTER STREET, LONDON WALL
LONDON, E.C.2

Telephone: LONDON WALL 4432 & 2626

and the method can be used for large articles which would otherwise need very large dip tanks.

Mr. LLOYD: I am glad Mr. Shaw has mentioned flow coating. It is a very interesting subject. As Mr. Shaw has explained, you can coat a very large article with a comparatively small volume of paint. One point which I would make is that the flow coating process is not to be compared with spraying, because the paint that runs off the work goes back into the system and you get aeration. The remark that I made about the dip plant applies in this case; it is a good thing to have a large input of fresh paint into the flow coating system.

Mr. SHAW: In the type of plant about which I am thinking that difficulty can be overcome quite easily by having a double tank reservoir. The aeration is dealt with in one tank and there is a lead from the bottom of that tank to another tank upon which you draw for replenishing the flow coating system.

Mr. LLOYD: I was thinking more more of the deterioration of the paint.

Mr. SHAW: As you get a rapid turnover of paint, that does not matter so much.

Mr. LLOYD: There is so much new paint being put in that you just do not get that, apparently. I understand.

Mr. HANDS: Has Mr. Lloyd had any difficulty about hot spraying white enamel? We have carried out this work using white enamel tinted to the far end of the blue scale. After we had applied it with the hot spray process and stoved it, we had completely lost the blue. Is that Mr. Lloyd's experience?

For the purpose of obtaining some actual figures for the economics of hot spraying, we ascertained the costs for a small wringer. The saving in enamel was 30 per cent. and the saving in spray labour 40 per cent. Assessing it on the basis of an output of 8,000 articles a week, the total saving over the normal spray method was £3,000 per year.

Mr. LLOYD: That is very interesting. With regard to the first point about the deterioration of the paint or the loss of the blue, I have had some experience in hot spraying white enamel but I have not noticed that effect. Of course, white enamels vary enormously in their sensitivity. Was the enamel used for the hot spray specially prepared for the process?

Mr. HANDS: We used for the hot spray an enamel which was exactly the same as that used for the normal spraying process, but we got two totally different shades.

Mr. LLOYD: Sometimes it depends to some extent on how long the paint has been at temperature. We are conducting a series of trials; they are as yet only partially completed and there is much more work to be done. In the case of a hot spray method with a big mixer with, say, 20 gallons of paint in a closed circuit, if the paint is brought up to temperature and continuously pumped round on an experimental basis a certain amount of deterioration takes place.

Mr. HANDS: The enamel was put into the pressure plant and run through the heater, and it was used in half-an-hour. We have not found the answer to this problem, and I wondered whether you had had the same experience.

Mr. LLOYD: We spray white enamel, but we have not experienced that problem. There has been some difference in the appearance of the flow on flat surfaces and there has been a certain amount of difficulty in doing awkward patches with a spray gun, but that is mainly due to the handling of the gun.

Mr. HANDS: It might be due to lack of technique, for it is quite different from a normal spray. The loss of blue is quite definite, and I should like anyone who has had any such experience to give me his views.

Mr. LOGAN: I cannot give Mr. Hands the answer, for that would be ridiculous, but a variation between ·5 and ·3 makes a tremendous difference to the colour of whites, pale cream and other pale colours. When I hear that there has been a saving in paint of 30 per cent. I imagine that some is being saved on the coating of the job and not just on the over-spray.

Mr. HANDS: The answer is no, definitely.

Mr. LOGAN: Then I cannot help you.

The CHAIRMAN: All this discussion goes to show how necessary the new Group is.

A Member: The trouble might be

due to the fact that a certain amount of flotation is occurring. Blue pigments in enamel do tend to float to a certain extent. There has been a lot of trouble in that way, but it has been overcome in the last few years. When paint with far higher solids is pumped in, this would tend to give the pigment a different flotation, and that might be the cause.

Mr. HOWES: I congratulate Mr. Lloyd on the shapely curves which he got for the viscosity temperature determinations and for viscosity against thinners. (The speaker referred to the lantern slide diagrams.) I have had about twenty years in a paint laboratory, and I can assure him that curves of that nature are the exception rather than the rule. I often wish I could get them to look as nice as that. Presumably the curve was for an alkyd enamel thinned with butyl, for the curve is very much straighter when the thinning is with a bituminous enamel.

Much trouble has been caused in dipping by failure to realise the effect produced by bringing in from outside heavy gauge material and putting it into the dip tank in a cold condition. I have had a lot of headaches about that. It is something to which insufficient attention is paid, especially in cold weather. This causes trouble when starting up a plant, and you get tears, and they sometimes adhere to the upright as well as to the material.

Mr. LLOYD: The point about the temperature of the work is a very good one. I have experienced that many times, especially in the winter; when work is put into a dip tank you can get trouble until it is up to temperature. You must try to control variations in temperature and humidity. When I mentioned air movement, I had in mind people leaving open a large gate at the end of the plant, for that can make quite a difference. Certainly, the point about cold work is a very important one.

Mr. SUDBURY: Have you any experience of electrostatic hot spraying?

Mr. LLOYD: I have no practical experience of it. I mentioned it merely to complete the picture of the trend in processes.

Mr. STUDHOLME: Can Mr. Lloyd say something about withdrawal speeds from dipping plants?

Mr. LLOYD: We estimate the withdrawal speed on the Rotodip plant in relation to the rotation speed; the withdrawal speed of the metal is calculated in inches per minute or some other measure. I have no figures for this because we always calculate it on a rotational dip by the speed of rotation. It could be worked out, but it would take time. The rotational speed with a large motor-car body is about one revolution per minute, which will give some idea of the rate at which it comes out.

Mr. BRACE: Does phosphating tend to eliminate differences in the effect of a surface condition in relation to the time allowed for the draining off of any coating? I find that if you do not give chemical pretreatment to a metal surface you get some differences in the rate of flow on the surface which depend on the actual surface condition of the metal. In other words, a sort of bright cold-rolled surface will give a lot of trouble, whereas a surface which has been subjected to pretreatment will behave differently. I have not had much experience of the effect of chemical coatings. Does the difference in surface finish also affect the phosphated layer and produce a difference, and do chemicals affect it?

Mr. LLOYD: I deliberately omitted the question of surface finish because it is such a big subject. I should like to suggest to the new Committee that this subject justifies a complete paper on its own. It is no good trying to sandwich in something about surface finish in a paper on dipping and spraying. A surface finish has a profound effect not only on the finished article but also on the actual mechanism of the paint drip off the article. Whether it be a phosphated surface or the difference between a block plate mill and cold reduced strip, it makes a big difference. During my remarks I have assumed that we are dealing with a constant surface throughout.

Dr. WERNICK: Can Mr. Lloyd indicate what the constant surface was?

Mr. LLOYD: A constant surface is remarkably constant. We must hand it to the steel people, because if you keep a record of surface replicas which you get from a first-class cold

reduction mill nowadays you find that they are remarkably constant. Sometimes one finds that they are too good, the surface being too bright and too smooth. Nevertheless, the surfaces certainly are consistent.

Dr. WERNICK: Have you used a profilometer or some other such means to give you a measure of the quality of the surface?

Mr. LLOYD: I have not much experience of using a profilometer. We use plastic surface replicas. I agree that a profilometer would provide a more precise record.

Mr. HOWES: To revert to what Mr. Shaw said about the flow coating method of application, I have had to deal with complaints during my experience and I have had more complaints about flow coating than about any other type of coating. This is probably due to the fact that in most cases such a lot of paint is exposed in a thin film and you get trouble with evaporation and oxidation.

Mr. LLOYD: I can verify that. I have seen a flow coating apparatus where one wanted a continuous solvent feed. It was not a matter just of adjusting the viscosity periodically. Even then it was a job to run it. It depends on the work being done.

Mr. W. E. CATTLEY: Mr. Harvey spoke of the use of the phosphating process as a type of inspection process in which one could tell whether the article had been thoroughly degreased or whether there were any rust patches. Seeing the layout of the Rotodip plant, it occurred to me that there is little opportunity of an inspector getting in there. Has Mr. Lloyd any views in that respect in connection with the Rotodip plant?

With regard to the treatment of the surface after the bodies have come out of the plant, I have seen one plant where about 100 per cent. of the bodies were stripped down to the bare metal and no treatment was carried out on the bare patches apart from repainting.

Mr. LLOYD: The first question is a lot the easier of the two. I do not know whether this applies to all the big Rotodip plants in existence. On the one which I have some part in running, at the end of the cooling section there is a little platform, called "the admiral's quarter-deck," where you can duck under the body while it is rotating and watch the whole of the surface very closely. One or two of my workmen almost hang on to the body while it is going round in order to complete the examination. It is certainly possible to get quite close to it.

What one does in the case of rubbing off down to the bare metal is a compromise. Here we encounter a question with which the steel surface finishing people could probably deal. It is difficult to get a finishing process to apply to bare metal in some small patches. There are processes, but they are difficult to use, and they are very difficult to use on a continuous conveyor. What generally happens is that these patches get a coat of primer. Mr. Harvey pointed out that the bare patches usually occur on the parts of a car body which rarely give trouble in service; they are more or less parts of big outside panels, and most of the corrosion is at the bottom of door inner panels, and on parts that you do not see and which usually rust from the inside. A bare patch on the top of the bonnet will obviously receive special treatment in spite of the fact that it is not phosphated because it has the merit of covering very quickly after it is bared. We are waiting for a good process with which you can treat a bare patch; that is really the position.

The CHAIRMAN: I know nothing about it, but I have recently returned from a trip round the world and I remember one painting shop—it may be common practice—in which they dipped or sprayed the body with carbon black and methylated spirit. The only labour they can get there is displaced persons, and these people rub off the carbon black, and that is sufficient. Believe me, a displaced person does not rub more than is necessary. That struck me as an ingenious method to use when you have an unintelligent crew of men.

On your behalf, I thank Mr. Lloyd for his lecture. He has thrown out a number of problems of scientific interest. I should say that the Committee will have its programme for next year practically written up as a result of the suggestions made by Mr. Harvey and Mr. Lloyd.

Nitrocellulose Aerosol Applied Lacquers

by

H. G. PHILIPS, Jnr.
(Hercules Powder Company*)

THE field of aerosol-applied materials now encompasses a wide variety of products. Probably the most recent development has been the aerosol application of protective finishes for coating small household objects and for touch-up purposes. Nitrocellulose lacquers, because of their rapid dry and excellent properties, are especially suitable for this use.

Typical aerosol propellants such as dichlorodifluoro-methane are not solvents for nitrocellulose or other lacquer ingredients; however, most lacquer vehicles can be packaged as aerosols by modifying the solvent combination. The fluorinated-chlorinated hydrocarbons used as propellants act in much the same manner as the diluent in a lacquer solvent combination. By using rich solvent combinations containing no diluent, the lacquer vehicle will tolerate a considerable quantity of propellant. Aerosol lacquers which vary in solids from 12 per cent. to 18 per cent. can be packaged in this manner.

Typical aerosol lacquer formulations, the relative miscibility of lacquer ingredients with typical aerosol propellants, the methods of packaging aerosol lacquers, and some typical uses for aerosol-applied lacquers are discussed in this article.

An aerosol is defined as "a suspension of fine solid or liquid particles in air or gas." The meaning of the word has been changed a great deal through use, however, and today it might include all those products which depend upon the power of a compressed, liquefied gas to dispense them from the container.

Aerosols may be divided into three basic types:

(1) True aerosols or space sprays, such as insecticides or deodorants.

(2) So-called wet sprays for surface coating applications.

(3) Foam products, such as aerosol-applied shaving cream or whipped cream.

The aerosol application of materials is a rather new development. It began during World War II with the development of aerosol-applied insecticides. The basic patent (U.S. Patent No. 2,321,023) is a result of work by two scientists of the U.S. Department of Agriculture and was issued in 1943. Early aerosol dispensers contained pressures as high as 70 lb./sq. in. (gauge) at room temperature. Propellants such as the fluorinated-chlorinated methanes were used. Heavy, rather expensive dispensers were necessary to stand these pressures. Immediately after the war, however, low-pressure aerosol-applied insecticides came on the market. These made use of a moderate pressure of between 35 and 40 lb./sq. in. (gauge) and utilised the "beer can" type of container which was already in mass-production and which was much cheaper than the initial high-pressure dispensers. The market for aerosol-applied materials was considerably broadened by this development; numerous materials are now available as aerosol sprays. One of the most recent developments is the aerosol application of protective coatings. Nitrocellulose lacquers can be packaged in aerosol dispensers and, because of their rapid drying rate, are

Much of the subject matter included in this article was given in a paper at a meeting of the Chemical Specialties Manufacturers' Association in U.S.A., in June, 1952.

* Experiment Station, Wilmington, Del.

ideal for touch-up work and for refinishing small household objects.

Nitrocellulose lacquers can be packaged at reasonably high solids contents by modifying the solvent combination of the original lacquer. The ordinary solvent combination used for conventional nitrocellulose lacquers consists of a three-component system; an active solvent, a latent solvent, and a diluent. The diluent acts as a solvent for the resin and lowers the cost of the solvent combination. Aliphatic and aromatic hydrocarbons are useful as diluents for nitrocellulose lacquers. The fluorinated-chlorinated hydrocarbon propellants such as dichlorofluoromethane (Freon 12) are not solvents for nitrocellulose or other ingredients in the lacquer vehicle. By using rich, active solvents and by omitting the diluent from a typical solvent combination, high solids can be obtained in aerosol formulations containing the propellant as the sole diluent. Table 1 shows the miscibility of nitrocellulose and alkyd resins with typical aerosol propellants at 0° C. The relative miscibility of nitrocellulose and a typical nonoxidising alkyd, both dissolved in rich solvent combinations, is compared in Solutions 1 and 2. As can be seen, nitrocellulose tolerates a considerably larger amount of diluent or propellant before the solvent becomes too lean and the vehicle cannot be redissolved, but less before initial precipitation occurs (where the vehicle can be redissolved). Solutions 3 and 4 represent two typical nitrocellulose lacquers, one based on an aerosol-type solvent combination with which solvents and the other based on a conventional solvent combination with diluent. The rich-solvent combination

TABLE 1.

MISCIBILITY OF NITROCELLULOSE AND ALKYD RESINS WITH AEROSOL PROPELLANTS AT 0° C.

Ingredients	*1*	*2*	*3*	*4*	*5*
	Parts by Weight				
RS Nitrocellulose, ½-sec.	20	—	8·7	8·7	—
RS Nitrocellulose, ½-sec.	—	—	—	—	8·7
Beckosol 23	—	20	8·7	8·7	8·7
Dibutyl Phthalate	—	—	2·6	2·6	2·6
Methyl Isobutyl Ketone	64	64	24	—	—
Methyl Ethyl Ketone	—	—	24	—	—
Isopropanol	16	16	16	—	—
Cellosolve	—	—	16	—	—
Butyl Acetate	—	—	—	28	28
Butanol	—	—	—	12	12
Toluene	—	—	—	40	40
Total	100	100	100	100	100
Total solids, %	20	20	20	20	20
Viscosity, No. 4 Ford Cup, sec. ...	—	—	15	25	57
	Ratio of 50 : 50 Freon 11 : Freon 12 to Solution.				
Initial precipitation*	0·1 : 1	0·8 : 1	0·1 : 1	0·1 : 1	0·1 : 1
Extreme cloudiness ...	2·38 : 1	—	1·63 : 1	0·66 : 1	—
Complete precipitation†	3·0 : 1	1·44 : 1	2·01 : 1	0·71 : 1	0·71 : 1
Propellant at complete precipitation, % ...	75	59	66	42	42
	Ratio of Genetron 102J to Solution.				
Initial precipitation*	0·1 : 1				
Extreme cloudiness ...	2·1 : 1				
Complete precipitation†	2·56 : 1				
Propellant at complete precipitation, % ...	72				

* Where vehicle can be redissolved.
† Where vehicle cannot be redissolved.

505

ROCKHARD
HAMMER FINISH

The new Rockhard 505 two-tone Hammer Finish has been evolved to meet the demand for a material which is **fool-proof in application**—even vertical surfaces can be sprayed without any special care. 505 gives a constant pattern under all conditions.

OUTSTANDING FEATURES OF ROCKHARD 505

One full coat is sufficient

Economical in use

Excellent finish

Easily applied

Reasonable in cost

Needs normal spray gun equipment only

Write in now for further information on Rockhard 505 or telephone and ask for a technical representative to visit you

GITTINGS & HILLS
LIMITED
ENGINEERS OF INDUSTRIAL FINISHES
TOWER VARNISH WORKS, LONG ACRE, BIRMINGHAM
Telephone: East 0297/0298

containing no diluent tolerates considerably more propellant before complete precipitation occurs. The miscibility of two viscosity types of nitrocellulose are compared in Solutions 4 and 5; there seems to be little difference in these two types with respect to dilution with propellants.

Table 2 shows typical nitrocellulose aerosol lacquers formulated with rich-solvent combinations. The first formulation represents a clear lacquer and the second and third are green and white pigmented lacquers. Solids as high as 12 per cent. in the clear and as high as 18 per cent in the white are obtained in the final aerosol dispenser by using a 50:50 weight ratio of the lacquer to the propellant which in this case was Freon 12. Such lacquers show excellent spraying characteristics and good flowout with little or no sagging on a vertical surface; they also form tough, durable films.

In Table 3 a typical cold-spray nitrocellulose lacquer formulation is shown in comparison with the same formulation applied as an aerosol. The cold-sprayed formulation is approximately 8 per cent. higher in solids by weight than the aerosol-applied formulation. By volume, however, there is only a difference of approximately 5 per cent. solids. This is due to the high specific gravity of the aerosol propellants.

Because of the very low viscosity of nitrocellulose aerosol lacquers and because there is no provision for stirring the contents of the can, settling may be rather pronounced in pigmented formulations. Difficulties which arise from pigment-settling can be minimised to a certain extent by including a small steel or porcelain ball in the can at the time of packaging. When the can is shaken before use, the ball acts as an agitator to redisperse settled pigment.

As is indicated in Tables 1, 2 and 3, the viscosity of the lacquer to be aerosol-applied must be properly adjusted to obtain optimum atomisation. With a 50:50 weight ratio of lacquer to propellant, the lacquer should be thinned to a viscosity of approximately 18 seconds (No. 4 Ford Cup).

The data cited thus far indicate that the most logical way to obtain maximum solids content is to reformulate completely the solvent combination. This does not mean, however, that ordinary, commercially available lacquers cannot be packaged in aerosol dispensers. Conventional, commercially available lacquers can be pack-

TABLE 2.

TYPICAL NITROCELLULOSE (NC) AEROSOL LACQUERS.

Ingredients	*Clear NC Aerosol Lacquer.*	*Green NC Aerosol Lacquer.*	*White NC Aerosol Lacquer.*
		(Parts by weight)	
Solids Content			
RS Nitrocellulose, ¼-sec....	43·5	30·4	30·4
Non-oxidising alkyd ...	43·5	30·4	30·4
Dibutyl Phthalate ...	13	9·2	9·2
Chrome green, medium deep*	—	30	—
Ti-pure R-110†	—	—	30
Solvent Combination			
Methyl Isobutyl Ketone...	80	80	80
Butyl Cellosolve	10	10	10
Isopropanol	5	5	5
Ethyl alcohol 2B... ...	5	5	5
Total solids, % by weight...	24·4	34	34-36
Viscosity, No. 4 Ford Cup, sec.	18	18	18
(For aerosol application, the above lacquers were then mixed with equal parts by weight of Freon 12)			
Total solids in Aerosol Dispenser, %	12·2	17	17-18

* Added as RBH Dispersion No. 1. Sold by RBH Dispersions Division of Interchemical Corporation.
† Added as RBH Dispersion 6610.

what other COPPER SOLUTION *can give these advantages?*

Bright Copper Plating

- BRIGHT DUCTILE FINE-GRAINED DEPOSITS
- PORE-FREE DEPOSITS WITH A HARDNESS NEARLY EQUAL TO NICKEL
- EXCELLENT THROWING POWER
- UNEQUALLED LEVELLING PROPERTIES
- DEPOSITS PRODUCED SUITABLE FOR CHROMIUM PLATING

CRUICKSHANK'S

WESTINGHOUSE P.R. PROCESS

A new process producing smooth, bright copper deposits, having exceptional physical characteristics. The hardness and ductility of the deposit makes it one highly suitable for an undercoating for chromium plate. The process employs the principle of periodic current reversal applied to a cyanide type copper plating solution.

There are no organic addition agents, and the analytical control is relatively simple. The solution is stable in operation and has a wide plating range.

The brightener is of an inorganic type, consisting of metallic salts and cyanides. The physical properties of the deposit can be varied over a wide range, by varying the composition of the solution, the P.R. cycle, the current density and the brightener content.

The outstanding feature of this process is its exceptional levelling property and where full brightness is not desired, the ease of finishing is such that finishing is reduced to a mere colouring operation. This process also has valuable properties in the field of electro-forming, due to the exceptional throwing power and production of even, ductile deposits up to any given thickness. A truly useful tool in these days of shortages, why not investigate this process . . . NOW!

The Westinghouse P.R. Process is a development of the Westinghouse Electric International Corporation and is fully covered by British patents. Licence agreements are only available through R. Cruickshank Ltd., Camden Street, Birmingham 1, who are the sole licensors for the U.K.

EXHIBITING AT STAND NO. D226 B.I.F. BIRMINGHAM

R. CRUICKSHANK LTD
HEAD OFFICE: CAMDEN STREET, BIRMINGHAM 1

BIRMINGHAM • WEST BROMWICH • LONDON | TELEPHONE CENTRAL 8553 (6 LINES)

aged by obtaining these lacquers at rather high solids content, thinning them with strong solvent combinations such as those cited here, then mixing them with aerosol propellants. Many lacquers are made miscible in this manner; however, the solids content of such lacquers may be 2 to 3 per cent. lower than when the solvent combinations are completely reformulated.

A comparison of typical aerosol propellants is shown in Table 4. They are listed in order of decreasing miscibility with nitrocellulose. As the miscibility with nitrocellulose decreases, the propellants increase in absolute pressure exerted, Freon 11 having a pressure of 15·5 lb./sq. in. at room temperature, Freon 22 exerting a pressure of 150 lb./sq. in., and the other propellants falling in between. Freon 12 seems to give about the best compromise for miscibility and pressure in propelling a lacquer with a 50:50 lacquer-to-propellant ratio. Lower vapour pressure propellants are not so satisfactory because it becomes necessary to use more propellant to obtain the same atomisation effectiveness and this would, of course, result in lower solids. Higher pressure propellants, such as Freon 22, exhibit poorer miscibility. When smaller amounts of such higher vapour pressure propellants are used, satisfactory atomisation cannot be obtained.

TABLE 3.

ORDINARY COLD-SPRAY APPLICATION VERSUS AEROSOL APPLICATION OF TYPICAL NITROCELLULOSE LACQUER.

Ingredients.	*Typical cold-sprayed Nitrocellulose Lacquer. (Parts by weight.)*	*Aerosol application of same Lacquer Vehicle. (Parts by weight.)*
RS Nitrocellulose, ½-sec. ...	8·7	5·2
Non-oxidising Alkyd ...	8·7	5·2
Dibutyl Phthalate	2·6	1·8
Butyl Acetate	28	—
Butanol	12	—
Toluene	40	—
Methyl Isobutyl Ketone ...	—	30·2
Butyl Cellosolve	—	3·9
Isopropanol	—	1·9
Ethyl Alcohol 2B	—	1·8
Freon 12	—	50
	100·0	100·0
Approximate total solids, % by weight	20	12·2
Approximate total solids, % by volume...	15·3	10·8
Viscosity, No. 4 Ford Cup, sec.	26	—

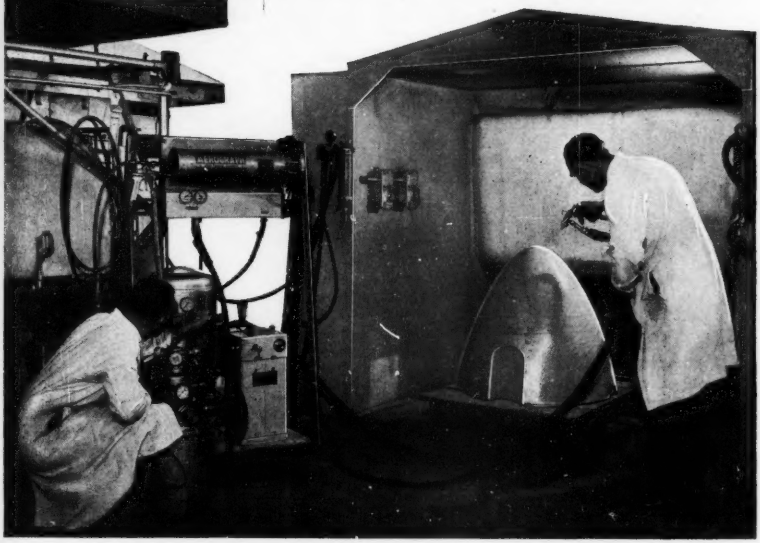
TABLE 4.

TYPICAL AEROSOL PROPELLANTS.

Propellant in order of decreasing miscibility with Nitrocellulose.	*Specific Gravity (liquid at room temperature).*	*Absolute Pressure. lb./sq. in. (Gas at room temperature.)*	*Boiling Point at 1 ATM., ° C.*
Freon 11	1·466	15·5	23·8
50/50, Freon 11/Freon 12...	1·380	42	−15
Genetron 102J†	1·158	42	−16
Freon 12*	1·294	94	−29·80
Genetron 102P†	1·176	101	−34·9
Freon 22	1·177	150	−40·80

* Approximately Equivalent Miscibility.
† Used in U.S.A. but not known to be generally available in Britain.

HOT SPRAY PAINTING



How to Control the Finish—from the Start

The great advantages of Hot Spray painting are only just being realised. For many industrial purposes the use of the pre-heating process will give an excellent finish much more quickly, with less labour and with an appreciable saving in cost.

For those who want to know more about it, the Demonstration Centre offers full facilities for practical demonstrations on customers' own products. What is more, we will gladly train paint-shop operatives at specially arranged short intensive courses—at no cost or obligation to the customer.

This is *your* opportunity to gain impartial and unbiased advice on the process that is revolutionising many industrial finishing procedures. If the process is suitable for *your* product, we will show you how best to use it. If it is *not* suitable we will save you expensive "trial and error".

The photograph shows a corner of the Demonstration Centre with operators hot-spraying synthetic enamels at the water-washed spray-booth. Three types of paint heaters are shown in the illustration. Take advantage of this "know-how" and let us help you to *control* your finish.

Just write to—

Demonstration Centre

JOHN HALL

JOHN HALL AND SONS (BRISTOL AND LONDON) LTD · HENGROVE · BRISTOL 4

There are numerous valves and dispensers on the market for dispensing the various aerosol-applied products. The "Precision" valve used on either the "Crown" or "Continental Can"* dispenser and possibly on other type dispensers is satisfactory for aerosol-applied lacquers. New valves are continually being developed and some of these look interesting. Finger fatigue and plugging of the valves are the most common faults, and these difficulties should be avoided by proper valve construction. Some aerosol packages have a rubber gasket in the valve. This is unsatisfactory because ultimately the rubber will swell in lacquer solvents and cause the valve to work improperly. Polyethylene and nylon parts now being used in some valves are greatly superior to rubber in this respect.

Most aerosol dispensers operate in a rather simple manner. The aerosol lacquer is actually a solution of the lacquer and liquid propellant with a small amount of propellant in the vapour phase in the top of the dispenser. As the valve is released, lacquer is forced up and out a standpipe attached to the valve. The material then goes into the expansion chamber where it is atomised into fine particles. In spraying typical aerosol lacquers, it is necessary to hold the dispenser approximately 10 inches from the surface to be sprayed. This allows the propellant a sufficient length of time to evaporate before the lacquer particles reach the surface. If the dispenser is held too close to the surface being sprayed, propellant may be entrapped in the film and cause bubbles. The Federal Trade Commission in U.S.A. allows a pressure of about 55 lb/sq. in. in the type of aerosol dispenser described above. When the lacquers are thinned to 18 seconds viscosity (as are the lacquers described above) and mixed with equal parts of Freon 12, a pressure of 55 lb./sq. in. or less is obtained which passes Government regulations.

In aerosol-applied lacquers, the atomised-lacquer particles are 100 to 200 microns in diameter, which is considerably larger than the particle size obtained in conventional spray guns. Cold-spray lacquers are normally atomised to a particle size of less than 100 microns. This means that lacquer applied with a conventional spray gun will have a slightly smoother appearance than an aerosol-applied lacquer film.

For packaging nitrocellulose aerosol lacquers, two methods are used commercially: (1) the pressure-filling process, and (2) the cold-pack or refrigeration process, which is probably the most commonly used. In the pressure-filling process the lacquer is weighed into the aerosol dispenser, the dispenser is capped, and the propellant is then forced in through the valve. The pressure-filling process is carried out at room temperature and results in less precipitation of the lacquer vehicle. In the refrigeration process, the lacquer is weighed, or measured, into the dispenser as a liquid at a temperature below the boiling point of the propellant—at about −35° C. when Freon 12 is used. The propellant is added in the same manner and the dispenser is then warmed to room temperature in a warm water bath, tested, labelled, and shipped. In the pressure-filling process, a pressure of about 10 lb./sq. in. higher than in the cold-pack process is developed because some air is not displaced in the pressure-filling process. This excess pressure is eliminated by opening the valve with the dispenser inverted to allow the remaining air in the dispenser to be released and the pressure to be reduced to that exerted by the same formulation in dispensers filled by the refrigeration process.

The present uses of aerosols seem to fall into two rather broad fields. The first and probably the largest volume field to date is that of industrial touch-up. Appliance manufacturers, such as producers of refrigerators and other kitchen equipment, office equipment, and farm machinery, are among the users of aerosol touch-up lacquers. The idea is to supply dealers and repair men with kits to match exactly the factory finish. The second field, marketing as a trade sale item, has been restricted thus far to specialty coatings but offers a large potential market.

---

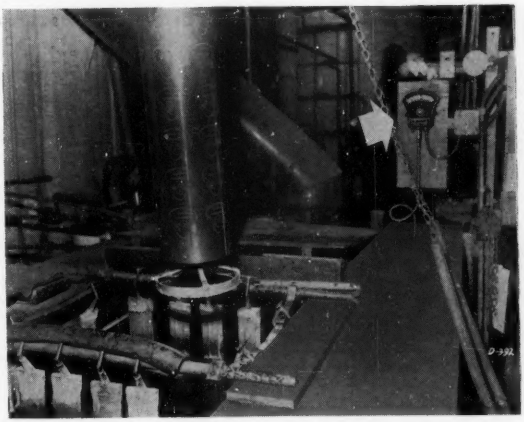
* These are trade names for valves, parts and dispensers widely used in the U.S.A.—Ed.

PLATING CONTROL OF ROTOGRAVURE PRINTING ROLLS

By Leo Walter

STEEL or case-iron rotogravure rolls have to undergo special plating operations in succession. A typical American method adopted is the following, using thermostatic control of plating solutions. The rolls undergo at first a cyanide copper plating process at 120° F. for electrodeposition of copper. Rheostats and control switches are used on large acid copper plating tanks to regulate current density being delivered to several sections of the bath, which is thermostatically controlled during this second stage at 110° F. During the third stage chromium plating at 120° F. is carried out and temperature is controlled by means of electrical thermometer-controllers as illustrated.

As can be seen, the copper plated and etched rolls are mounted in a vertical position, ready to be lowered into the tank. Treatment of rolls is performed as a service to rotogravure newspapers, and for printers of labels, wraps, vinyl tablecloths and others.



FIRST INFRA-RED PLANT IN HONG KONG

THE first infra-red plant for use in Hong Kong has recently been made up from infra-red reflector units supplied by The British General Electric Co. Ltd., representing the G.E.C. in Hong Kong, to the Cheong Kong Electroplating Works, a subsidiary of the Honor Metal Manufacturing Co. which manufactures electric torches. At the Cheong Kong Electroplating Works torch cases are plated and painted black, red, blue or green, and the new plant will be used to dry paint on finished cases.

The equipment consists of twelve 3 ft. six-lamp infra-red reflector units, divided into three groups of four reflectors. Two groups of reflectors are placed at either side of a conveyor, which is a continuous mesh belt running over two 12 in. diameter drums, the third group being centrally placed above it. The lamp units are mounted on sheets of polished aluminium and with the mesh conveyor form an enclosed whole.

The oven, the internal dimensions of which, including the enclosed extension at either end, are 15 ft. long by 36 in. wide by 8 in. high, is divided into four sections, numbered from right to left, the normal Chinese custom. Each section has two switches, one controlling the side lamps and the other controlling the overhead lamps. Owing to the unique voltage supply in Hong Kong, 346/200 v., three lamps are connected in series across the outers. The continuous mesh belt, already mentioned, is driven by a ¼ h.p. motor vee belt coupled to an old four-speed Austin car gearbox which is in turn coupled to the driving drum, and gives a maximum conveyor speed of 12 ft. in 20 minutes and a minimum of 3 ft. in 20 minutes. Intermediate speeds are obtained through gearbox or vee pulleys. The capacity of the oven is such that using only two-thirds of the lamps, giving an approximate loading of 12 kw., 1,260 torch cases on thirty-six trays can be dried every hour. Previously, using four locally made 6 kw. convection ovens, only 460 cases could be dried per hour, although the consumption of electricity was twice as great.

INFRA-RED STOVING IN THE MOTOR INDUSTRY

Some observations on the use of tubular sheathed elements and projectors for infra-red stoving of components and parts in the motor industry

INFRA-RED equipment is becoming increasingly popular in the motor car industry with the rapid change over to synthetic polymerising paint finishes. Harder and more durable finishes are now obtainable with these paints than have been possible hitherto using cellulose and other lacquers. The greater penetration of the infra-red radiation ensures better adhesion and more complete removal of solvents as compared with other methods of drying.

For all practical purposes associated with the use of infra-red equipment in industry, infra-red can be defined as an electro-magnetic radiation, which, falling on a material substance causes its temperature to rise; no intervening medium being required to effect the heat transfer.

The actual term infra-red is derived from the position of this particular radiation in the complete eiectromagnetic radiation spectrum, since it lies just below visible red as can be seen in Fig. 1. Infra-red radiation is similar to light in that it may be absorbed, transmitted, reflected and refracted according to the waveband covered by the radiation and the physical characteristics of the material receiving it.

Consider, for example, the effect of the infra-red radiation stoving paint on metal sheets and other components used in motor car and public transport vehicles.

Paint stoving of metal panels

In paint stoving by infra-red, the rate of temperature rise of the painted article, and the final temperature reached, will depend on such factors as the intensity of radiation on the painted surface, the time of exposure, the mass of the article, the wave-band of the radiation employed and the absorption characteristics of the paint and of the underlying surface. For any given article exposed to the radiation from a given infra-red emitter for a given time, the time required to stove the paint film will be governed by the power of the paint to absorb radiation within the wave-band employed, and this power is affected by the colour.

The effect of colour on the temperature rise of painted flat steel panels ·049 in. thick is shown in Fig. 2. Black paints tend to absorb more of the radiation over a very wide wave-band, whereas a glossy white paint is comparatively almost non-absorbent at the shorter wave-lengths. Hence, generally speaking, the longer the wave-length the less difference there is in the temperatures reached by panels finished with black and white paints. This is exemplified in Fig. 2, from which it will be seen that there is an 80° F. difference in the final temperatures recorded for black and white surfaces when irradiated by infra-red lamps (Peak wave-length about 12,000 Angstrom Units), whereas the difference is reduced to 33° F. when similar panels are irradiated by Metrovick infra-red elements operating at 750° C. (Peak wave-length about 30,000 Angstrom Units).

For the sake of clarity in presenting the curves, the panels in the two tests were subjected to different intensities, but in the case of the infra-red lamp the lower intensity employed tends to

reduce the difference between black and white. Intermediate colours have been omitted for the same reason, but it can be stated that the order usually is black, grey, green, blue, red, yellow, white. Depending on the type of paint however, it is sometimes found that red or yellow paints, for example, may be less absorbent than white, and the order given above is only a general guide. Fig. 2 includes additional curves showing the effect of intensity of radiation on the rate of rise of temperature.

Obviously, by using a conveyor with the plant, it is possible to grade the intensity of radiation from entry to exit ends of the oven to obtain a desired temperature/time relationship in the object being heated. Most frequently the entry end has the highest intensity to give a quick initial rate of temperature rise, the intensity being reduced towards the exit to

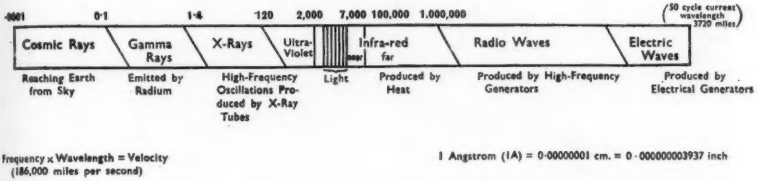


Fig. 1. The complete electromagnetic radiation spectrum, showing the position of light, heat and infra-red.

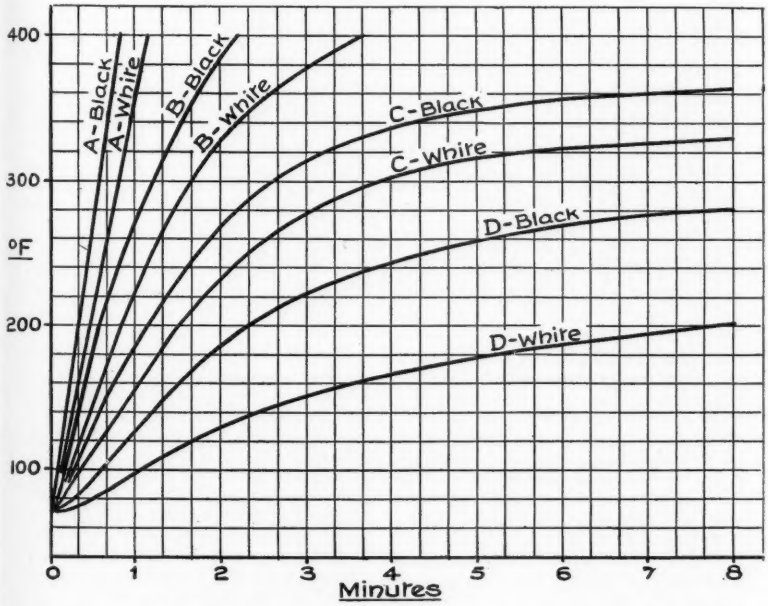


Fig. 2. Effect of colour on the temperature rise of painted flat steel panels ·049 in. thick.

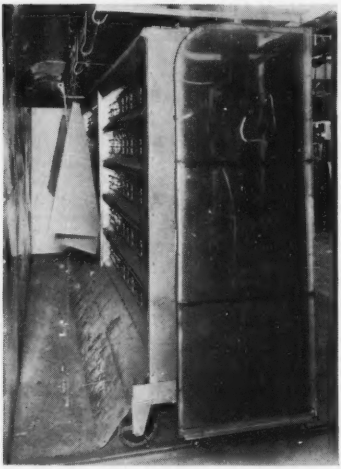


Fig. 3. Metropolitan Cammell plant for stoving 20-gauge aluminium panels

reduce this rate and if necessary maintain the temperature at a desired figure. On occasion, for example, in the stoving of "Wrinkle" paints, it may be necessary to reverse the arrangement and arrange for an initially low rate of temperature rise.

Fig. 3, shows a plant designed and made by the Metropolitan Cammell Co., for a paint stoving 20-gauge aluminium panels used in the building of single—and double-deck omnibus bodies. As shown in the illustration a single bank of element projectors is mounted on a wheeled track facing a reflecting surface to form an open tunnel of adjustable width. This arrangement enables different sizes and shapes of panel to pass through on the conveyor.

The panels are sprayed with undercoating on both sides and then stoved, after which a top coat is applied to one side only, and this is also stoved. The panels are then ready for immediate assembly. The plant is fitted with ten 6 ft. 6 in. Metrovick infra-red element projectors each having a loading of 6 kW. In addition a control unit allows variation in electrical loading and temperature of the projector bank to suit different stoving requirements.

Fig. 4, shows an infra-red stoving plant with conveyor for stoving reconditioned items for bus body overhaul. It is designed to do one set per hour, allowing for parts requiring more than one coat of paint. The oven has a total loading of 74 kW. provided by twenty-four 3 ft. standard Metrovick projectors, and measures 10 ft. 6 in. long by 6ft. 6 in. wide by 8 ft. high. An air recirculation system is fitted, providing a power exhaust to atmosphere, and assisting in producing an even surface temperature on the varied products being stoved. Control is provided to give an infinite variation of heat output from the second half of the oven.

Paint stoving of castings

Constructed by A.E.C. Ltd., the infra-red oven shown in Fig. 5, incorporates nine standard Metrovick 3 ft. 4 kW. projectors mounted on a simple framework. The oven is used for drying chlorinated-rubber grey air-drying paint and grey synthetic paint on horizontal and vertical engine castings. The engines weigh approximately 1,800 lb.

Although the castings shown in Fig. 6 are not used in the motor car industry the application is of interest in that the machining took place after stoving without damage to the paint and similar applications may be useful in the motor car industry. This plant which includes a Metrovick oven, a conveyor, and a dip tank, applies and stoves synthetic enamel on a variety of small castings and forgings.

The problem was to devise a scheme for painting handwheels without applying paint to the machined portions and it appeared that dipping could not be used for this very reason. By using infra-red drying, however, it is now possible to dip and stove the wheels before machining them, the finish obtained in this way being durable and tenacious enough to withstand the handling received in later machining operations. The handwheels, which form the major portion of the products to be stoved, vary from 4 in. to 28 in. diameter and up to 70 lb. in weight.

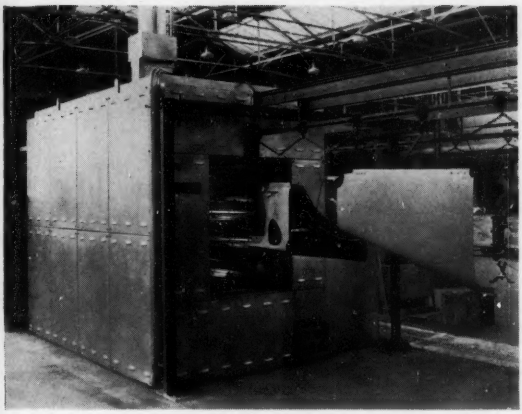


Fig. 4. Infra-red stoving plant for stoving bus body panels and parts during overhaul.

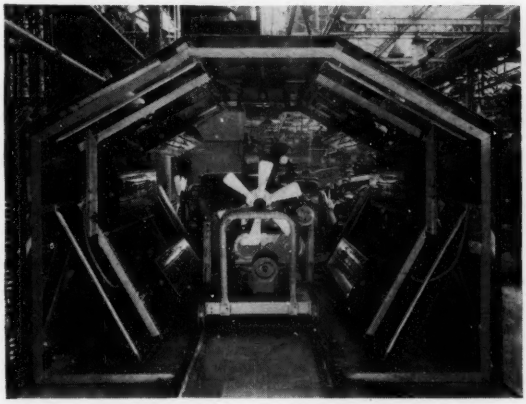


Fig. 5. Special oven used by A.E.C. Ltd. for stoving paint on engine castings. These weigh approximately 1,800 lb.

The plant was designed for a minimum output of 10 tons of castings per 44-hour week and actually handles considerably more. The electrical loading of the oven which is 36 kW. can be reduced by means of a series of energy regulators to suit the products and production rate required. Electrical interlocks ensure that a stoppage of the conveyor automatically switches off the infra-red oven. Heat losses from the oven are reduced to a minimum by the use of heat-insulating panels of mild steel lagged with glass wool.

Paint stoving of accessories

Fig. 7, shows one of three similar plants specially designed for stoving synthetic paints on motor car accessories; these plants can handle a total of up to 60,000 accessories in a 40-hour working week.

The plants are complete with degreasing equipment and have water-wash spray booths and monorail conveyors, the latter fitted with a device which rotates the accessories during their travel through the stoving plant. The accessories pass through a cooling chamber on leaving the

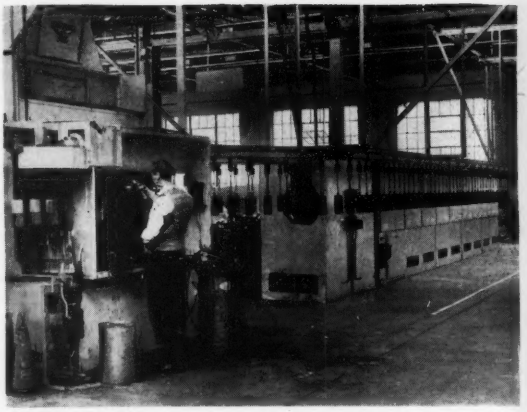


Fig. 7. Highly mechanised plant for stoving synthetic paints on motor accessories at an average output of 60,000 per week of 40 hours.

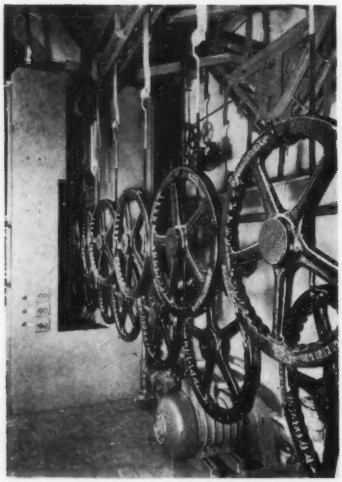


Fig. 6. Conveyor, dip tank and stoving plant combine to produce synthetic baked finish on these castings.

infra-red plant, after which they are inspected and passed for packing and shipping.

The infra-red plants are 40 ft., 28 ft. and 21 ft. long respectively, and incorporate an air recirculation system and temperature control units. The elements operate on 415 volts, 3-phase, with a total loading of 300 kW. for the three plants.

In another motor component plant two identical plants are used for painting and stoving bus window panels. The pans are dipped manually into the paint and then loaded on to the conveyor which takes them through the infra-red oven. The oven consists of six separately controllable banks of infra-red units, four banks each consisting of five 3 ft. 3 kW. projectors, and two banks of five 3 ft. 4 kW. projectors. The stoving time is approximately 2¼ minutes. Each oven is 12 ft. long, 5 ft. wide and 9 ft. high, and is normally run at a loading of 40 kW., the additional capacity being available to cater for future requirements.

Ilmenite Being Mined in Natal

MINING operations have begun at Ilmenite Hill, at Umgababa, twenty-five miles south of Durban, to recover the rich deposits of three of the world's most sought after minerals—rutile, ilmenite and zircon. The small hill at Umgababa is estimated to be worth £35,000,000.

About 5,000 tons of ilmenite, which is extensively used in the pigment industry, will be produced in a month. As the mine is on Native Reserve lands, the Native Affairs Department will receive 10 per cent. of the company's net profits.

Automatic Printing and Coating of Steel Sheets

Some Recent Developments

AS is well known, for many years the decoration of metal packings and boxes has been carried out using specially-designed rotary printing and coating machines, the coating and decoration being applied to the flat sheet. In the case of small packs, a number of individual impressions is applied to each sheet, the sheet finally being divided by gang slitting machines, and then tooled up into its final form. Each coating is applied and stoved separately, and in the case of many packages in addition to the decorative coating on the outside of the pack an internal lacquer coat is also applied.

Until recently the maximum size sheet which could be processed in this manner had a width of 36 in., the limitation in stock size being decided by the coating and printing machines which were available.

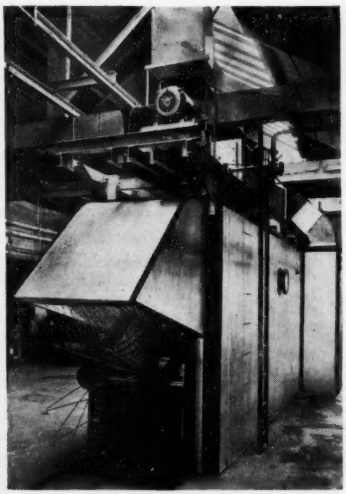


Fig. 1. Standard type of conveyor oven to take sheets up to 36 in. width

A specially designed oven is employed to follow the printing and coating machines, the conveyor system being arranged to carry the sheets in an almost vertical position, and conveyor systems of $1\frac{1}{4}$ in., 1 in. and $\frac{3}{4}$ in. pitch are in common use, that is conveying $9\frac{1}{2}$, 12 and 16 sheets per foot of conveyor length. Such an oven is illustrated in Fig. 1.

During the last few years, the drum industry in particular has been closely investigating the possibility of applying conventional printing and coating methods to the decoration and coating of large size sheet, and some two years ago one of the large drum-making establishments in the South of England installed an oven which was designed to handle sheets up to 54 in. wide and up to 16 gauge, though at the time when the oven was installed there was no printing or varnishing machine available in this country capable of handling this large sheet size. It is believed there is now available a coating machine which is capable of handling sheet up to 54 in. wide by 18 gauge, and that a design is being evolved for a printing machine to handle similar size sheets.

The trials which have so far been carried out on the coating machine have been extremely promising, and there is no doubt that within a short while such a machine will be available as a production unit. The oven mentioned above for wide sheets is shown in Figs. 2 and 3.

The question of handling large size sheet has also been very actively pursued in the United States of America, and a printing machine capable of handling a sheet 72 in wide by 16 gauge has been developed by the Hoe Co. of America and also a roller coating machine has been manufactured by the Wagner Co. of New Jersey. The Dexter Co., also of

America, have designed and built automatic feeders. At least four units of this type are now in production operation in the United States and are being used in the production of oil and paint drums up to 45 gal. capacity.

The first production line of this kind in the world to be built outside America has just been set into operation at the Bristol works of Messrs. Rheem Lysaght Ltd., and has been installed to handle sheets up to 72 in. wide for both printing and roller coating, and with speeds on smaller size sheet up to 4,500 per hr. The feeding, printing and coating machines and automatic unloading equipment have all been imported from America, but the transfer machine between the roller coating machine and the oven conveyor and the conveyor drying oven have been designed and installed by Stordy Engineering Ltd. The overall length of the complete line is in excess of 300 ft. 0 in., and the installation as can well be imagined is very impressive. (Fig. 4.)

In this plant the sheet for printing or coating is loaded on to pallets and is transferred to the appropriate loading position by means of a fork lift truck. Separate feeding machines are provided for both the printing and coating machines, which follow one behind the other, and a traversing carriage is provided for each feeding machine to receive the sheet pile which after being loaded on to the carriage is run in to the feeding machine over a rising table. The feeders are of the pneumatic pattern, and are provided with air blast separation.

When the plant is being run for printed work, the first feeding equipment transfers a sheet at a time from the pile into a dog conveyor, which in turn feeds to the printing machine, the centering of the sheet being accomplished by magnetic centering pulleys. After delivery from the printing machine, the sheet feeds out on to a special gripper face belt transfer system, through the feeding machine in front of the coating machine, and into a second dog conveyor. This belt system is arranged to retract when it is desired to use the feeding machine serving the roller coater.

The dog conveyor before the roller coater delivers the sheet through the coating rolls, which when running print are gapped open on to a transfer machine which is separately driven, and is designed to feed the sheet into the oven conveyor. This transfer machine is also arranged to retract to provide access to the coating rools for cleaning down and sponging, etc., and the belt system is driven from a hydraulic type infinitely variable speed unit.

The oven which has been installed has a heated section of 170 ft. 0 in., the oven body being some 11 ft. 0 in. high, the overall width of the oven casing being some 8 ft. 0 in., and

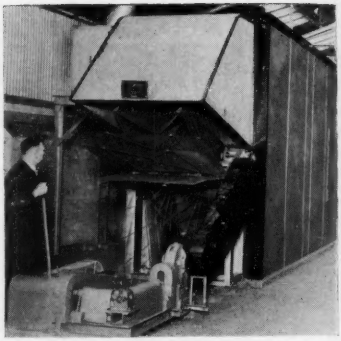


Fig. 2. Large oven installed in South of England to handle sheets up to 54 in. wide.

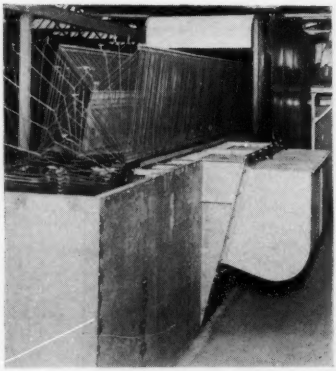


Fig. 3. Another view of the same oven, showing the conveyor system

following the oven section is a cooling section approximately 43 ft. 0 in. long.

The oven is arranged for town gas-firing, and is divided into six separate heating zones. The first two zones have been designed to handle the total cold work load on the system plus the radiation losses for these zones, the centre three zones being designed to take care of radiation losses only, the rear end zone being arranged to take care of radiation losses for this zone plus the whole of the fresh air load brought into the system. The fresh air is introduced through the unloading end hood and is taken into the recirculating duct for zone six and is then progressively recirculated from the rear end to the front end, finally being sucked away at the loading end of the system by means of a centrifugal type exhaust fan. The exhaust fan pulls from a duct system located above the loaded conveyor, the exhaust system also coupling in to the loading end hood, and this arrangement ensures that there is virtually no spillage at either end of fume laden or hot air to the shop. (Fig. 5.)

The supply duct system is arranged below the top conveyor track, distribution being by means of special nozzles extending for the full width of the oven—each nozzle being capable of adjustment over its length to enable correct distribution to be obtained in the work chamber, the combustion chambers being mounted above the roof of the oven casing. Six combustion chambers are provided, the front two zones are fitted each with two very large capacity multivane type circulating fans, the remaining four zones being provided with one circulating fan per combustion chamber.

Each zone is provided with its own thermostatic control, the controls being of Negretti and Zambra manufacture with mercury-in-steel measuring system, the measuring bulbs being of the averaging type. The controllers are of the compressed air operated pattern and work in conjunction with reverse acting spring loaded diaphragm type control valves fitted in the main burner line to each combustion chamber, the design of valve permitting of "floating" control.

Each combustion chamber is provided with flame failure control and spark ignition, the flame failure control being provided with a time delay purge feature to ensure that each zone is thoroughly scavenged before gas can reach the combustion chamber. The flame failure shut off valves are the control valves mentioned above, a small solenoid valve being provided in the compressed air supply to each diaphragm chamber. Shut-off valves are also provided in the pilot lines, these valves being of the solenoid type, except in the case of zones one and two where diaphragm type relay valves are used as shut-off valves. Wired into each of the flame failure circuits are air-flow switches to give fan failure protection to each combustion chamber.

It is anticipated that under running conditions the approximate maximum hourly gas consumption will lie between 20,000 and 22,000 c. ft. per hr. Since the operating temperature may at times be as high as 450° F. the fan runner gear is of the ring lubricated white metal lined pattern, the inner bearing of each fan being arranged for water cooling. All fans are driven by means of Vee rope drives from squirrel cage protected type motors, and a recirculation duct system is arranged above the conveyor and couples back into each of the combustion chambers. Provision is made in the design of the recirculating system to obtain correct thermal balance throughout the heated section.

In order to avoid any possibility of trouble occurring on the coated and printed work due to unequal drying resulting from the sheet being fed on to a cold carrier tray, bleed connections are taken from the main circulating system in zones one and two into the bottom return section of the oven with a recirculating connection into the main recirculating system, the purpose of these bleed sections being to preheat the carriers before they receive the wet coated sheets.

The cooling section, which as we mentioned above is some 43 ft. 0 in. long is provided with twenty-six propeller type cooling fans, these cooling fans being arranged to deliver large volumes of air at high velocity normal to the sheet as it is conveyed through the cooling section, the cooling fans being located between upper and lower conveyor tracks. Two

thirds of the cooling zone is sheeted in at the sides and three very large exhaust fans are provided to exhaust the cooling air to outside atmosphere. It may well be that during the winter months these exhaust fans will only occasionally be used, since the heat load released to the shop will very materially assist in heating the shop. The whole of the cooling end is completely sheeted in with expanded metal and sheet metal panelling. The cooling fan starters are gauged to give ease of operation. (Fig. 6.)

The oven casing, which is mounted on the main steel structure of the unit, comprises specially designed demountable type insulated panels, the panel construction being such as to offer a minimum of through metal from inside to outside resulting in high overall thermal efficiency. Insulated access doors also of special design are provided on both sides of the oven and at frequent intervals along the length. All supply and recirculating ducting has been manufactured from heavy galvanised sheet steel to avoid any possibility of the circulation of rust in the work chamber. Similarly the conveyor trays have been painted and stoved to reduce any possibility of rust trouble to the very minimum.

The oven has been designed to handle a maximum sheet size 72 in. long, the maximum width of sheet which can be accommodated in the conveyor being 45 in., and the maximum weight of sheet from which the mechanical gear has been designed will be 45 lb., and for feeds up to seventy-five sheets per min. (4,500 sheets per hr.).

The conveyor comprises four strands of specially developed finger type bush roller chain, the finger plates having a profile to ensure that the sheet is carried at a slight angle from the vertical and that there is no possibility of the sheet riding forward and offsetting against the back of the preceding tray.

The carrier trays have been fabricated from flat mild steel and are of a welded and riveted construction. The side members being tapered and the trays being riveted to the conveyor chains. The chains themselves run on a bright bar track which is supported in cast-iron track supporting brackets, and a special form of expansion joint has been provided at frequent pitch through the conveyor system. Great care has been used in lining up the conveyor tracks to ensure trouble-free running.

The conveyor system is driven from the front end through an eddy-drag coupling driven by a squirrel cage protected type motor, the coupling is provided with an electronic control system to give infinitely variable speed variation. From the coupling, a chain drive is taken to the input shaft of a single reduction worm gear, the output shaft of the worm gear being direct coupled to the main drive shaft of the conveyor system. This drive shaft is carried in heavy duty ball-bearing plummer blocks.

Immediately following the drive sprockets is a rack and pinion weight loaded tension gear unit whose purpose is to take up any slack in the conveyor system and to ensure that both sides of the conveyor are approximately the same tension. The main tensioning of the unit, is done at the unloading end by means of a solid tension gear provided with hand wheel adjustment from either side and operating on a tension shaft carried in two ball-bearing sliding housings. The top conveyor shaft at the tension end is supported in two heavy duty ball-bearing plummer blocks.

From the conveyor drive coupling is provided a lay shaft and drive to the roller coating machine which is driven from the oven conveyor system to ensure complete synchronisation between these two units and in addition an electronic control system is provided to enslave the press drive motor with the oven conveyor system to ensure complete synchronisation with this unit.

In addition incorporated in the drive control circuit is a non-overloading feature which can be set for any predetermined value, and which acts as a shear pin device.

After the work has passed over the cooling section it is delivered coated side down on to a take-off belt system with an independent drive. Where, however, it is necessary for the coated side to be face up as is required where subsequent passes through the system are necessary, a turn-over device, which can be retracted below the take-

Fig. 4. General view down the line of the Rheem Lysaght installation. This shows the feeding, printing, coating, stoving and drying equipment.

Fig. 5. The exhaust system couples in to the hood so that practically no fumes or hot air reach the shop.

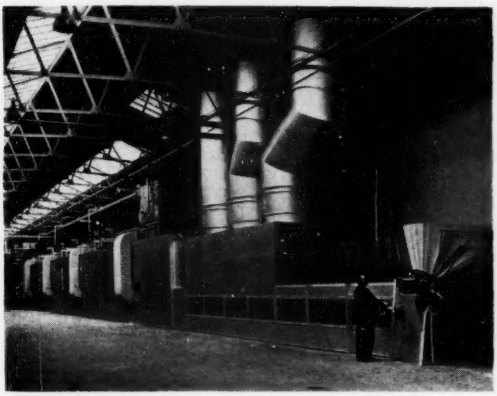


Fig. 6. The whole of the cooling end in cased in with sheet and expanded metal panelling.

off belt system, is provided and is driven from an extension to the rear end conveyor shaft. The lay shaft between the turn-over gear and the oven conveyor is provided with a differential unit and special precaution has been taken to overcome back lash due to out-of-balance.

The take-off belt system is extended into a pile stacker which is provided with a similar transfer table to those fitted to the feeder machines. The whole equipment is completely interlocked to ensure that a correct starting sequence is followed, and micro switches are provided at all points where trouble may occur. The main oven conveyor is also provided with an electro magnetic brake to bring the conveyor system quickly to rest in the event of any of the micro switches being tripped.

The finishing materials and process procedure for both the decorated and roller-coated work has been worked out by Robt. Ingham Clark and Co., who specialise in the manufacture of roller-coating materials and container finishes, in conjunction with Rheem Lysaght Ltd., and will form the subject of a subsequent article.

SHELL'S PLANS FOR NEW RESINS

SHELL CHEMICALS LTD. announce the commercial availability of their range of Epikote resins. Hitherto obtainable in development quantities only, from United States production, these resins are now being manufactured at a new plant which has just come into operation at Shell's Pernis Refinery in Holland.

It is stated that production at Pernis will be in the region of 1,000 tons per annum and represents the first stage in the programme for the manufacture of these resins on this side of the Atlantic.

Marketed in the United States as Epon resins, these products are reported to have established themselves, particularly in the surface coating and plastics fields, where their unique combination of properties, such as adhesion, flexibility, toughness and chemical resistance are of particular value.

It is claimed that the epoxide resins, which the Epikote range typifies, represent a major advance in the synthetic resin field comparable to that made by the alkyds and vinyls.

Books

The Metallizing Handbook, by H. S. Ingham, and A. P. Shepard. Published by Metallizing Equipment Co. Ltd., Chobham, Woking, Surrey. 250 pages, £1 1s. 6d.

ALMOST twenty years of experience in the design, manufacture and use of metal spraying equipment has been embodied in this book. The volume has only just been printed in this country and three-quarters of its contents have not been available previously in book form. The only other textbook on metal spraying was written well before the war and was revised in 1948, this new book therefore makes a valuable contribution to the available fund of knowledge on the subject.

It is divided into eight sections and these are listed at the front of the book. They are: an introduction to the process, a section on machine element work then corrosion-resistant coatings, miscellaneous applications, Metco sprayweld process, engineering data, ventilation, safety measures. These sections are followed by a series of notes and a comprehensive index.

The book forms a useful guide to the possibilities of metallising, and should be of interest both to the student and the experienced engineer. It is a pity that the method of reproduction makes some of the photographs rather "blurry." The diagrams on the other hand leave nothing to be desired.

SOLUBLE SILICATES VOL. 2

Their Properties and Uses

Reinhold Publishing Corporation—Chapman and Hall, 37 Essex Street, W.C.2. By James G. Vail, D.Sc. 670 pages. 120s.

IN Volume 1, the chemistry of the soluble silicates was dealt with in detail. It was devoted to the theoretical aspects of the subject, mentioning past and present manufacturing processes, the properties of homogeneous and heterogeneous systems of glasses, the formation of metallic silicates and other fundamental material.

Volume 2, slightly larger in size, deals with the more practical considerations involving the applications of soluble silicates to industry. Here are described the film-forming properties of silicates and their uses in all manner of industrial materials and techniques, including adhesives, laminates, sizing, fire protection, cements, plastics, etc. The use of soluble silicates in the form of gels and their many valuable properties as catalysts, protective agents and stabilising materials are covered in great detail.

FUEL ECONOMIST

EDITORIAL DIRECTOR: W. F. Coxon, M.Sc., Ph.D., F.R.I.C., F.I.M., M.Inst.F.

fortnightly

EDITORIAL CONTENT

Primarily to encourage efficient fuel usage based on practical considerations.

KEY POINTS

★ High efficiency solid fuel appliances.

★ Adaptation as to existing houses.

★ Economy benefits of correct insulation.

★ Parliamentary reports.

Coal, coke, smokeless fuels, gas, electricity, and oil are all covered —emphasis is on the user's needs.

READERSHIP

Housing and factory architects; Local government Officers; Fuel engineers; builders' merchants; Government officials and informed public opinion. Manufacturers and distributors of fuel appliances and equipment used in fuel economy.

ARROW PRESS LTD., 157 HAGDEN LANE, WATFORD, Herts.
Phone: Gadebrook 2308 Grams: Techpress, Watford

25/- per annum

I.C.I. To Erect 20 Million Dollar Plant in Canada

IMPERIAL CHEMICAL INDUSTRIES LTD. has decided to erect a plant in Canada for the manufacture of the new synthetic polyester fibre, "Terylene." The expenditure on this project will be a sum in excess of 20,000,000 Canadian dollars. It is the Company's intention that the necessary finance shall be found in Canada in accordance with proposals which have been approved by the Bank of England.

Construction of the plant will be initiated by a new wholly owned Canadian subsidiary of I.C.I. After the proposed segregation of the I.C.I. and du Pont interests in Canadian Industries Ltd., it is intended to offer this project to that successor company of C.I.L. in which I.C.I. will be the principal shareholder, and in which Canadians will participate as shareholders. This procedure is in accordance with I.C.I.'s policy of regarding the successor company as the normal medium for developing manufacturing projects in Canada.

A product of British research, this polyester fibre was discovered in the laboratories of the Calico Printers' Association Ltd. I.C.I. acquired the world rights, apart from the U.S.A. (where the fibre is being manufactured and sold under the name of "Dacron"). The basic Canadian patent was granted in February of this year. I.C.I. has invested substantial sums in research and development on the fibre, and production in the United Kingdom on a pilot plant scale started some years ago. The construction in the United Kingdom of a full-scale plant involving a large capital expenditure is well advanced.

I.M.F. Spring Conference

THE annual Spring Conference of the Institute of Metal Finishing is being held at the Hotel Majestic at Harrogate from Wednesday, April 22 to Saturday, April 25 this year. The decision to hold it in the North of England was made to meet the convenience of the members of the newly-formed North-West Branch and the Sheffield and North-East Branch, which was formed a few years ago.

A strong technical programme has been arranged, of which the aim has been to cover a wide field and cater for many interests in the metal finishing field. The Conference opens with an informal dinner on the Wednesday evening between 7 p.m. and 8 p.m., which will be followed by coffee and a talk by Mr. S. Dawson on "Forty Years in the Plating Industry." On Thursday members and their ladies are invited by the Mayor and Corporation to attend a civic reception and dance in the Harrogate Lounge Hall. This will be held at approximately 8 p.m., after dinner in the hotel. The Conference dinner will be held on Friday evening and will be followed by a Grand Coronation Masked Ball.

For the convenience of members who have to travel some distance, evening dress at all Institute functions will be optional. For those wishing to stay until Sunday, other special Institute events have been arranged, and there will be the usual hotel dinner and dance on Saturday evening. At this function evening dress is essential.

The entertainments committee (who will wear distinctive badges) will welcome ladies and will be happy at all times to advise and assist them during the Conference. A full and interesting programme has been arranged in which all ladies will be invited to participate.

Full details of the Conference programme are as follows:

CONFERENCE PROGRAMME

WEDNESDAY, APRIL 22

EVENING:

7.00—8.00 p.m.
Informal reception and dinner.

8.30 p.m.
Coffee Talk by Mr. S. Dawson (Canning and Co. Ltd.): "Forty Years in the Plating Industry."

THURSDAY, APRIL 23

MORNING

9.30—9.45 a.m.

Opening Ceremony by the Mayor of Harrogate, supported by the president.

First Technical Session. Topic: "Organic and Other Non-Electrodeposited Coatings." Chairman: The president.

9.45 a.m.—12.30 p.m.

"The Painting of Steel," by J. C. Hudson (British Iron and Steel Research Association).

"Corrosion Prevention by Paints," by J. E. O. Mayne (Cambridge University).

Discussion of above two papers.

11.00 a.m.

Coffee.

"Recent Advances in Metal Spraying by the Powder Process," by W. McDermott (Schori Metallising Process Ltd.).

"Recent Advances in Metal Spraying by the Wire Pistol," by W. E. Ballard (Metallisation Ltd.).

Discussion of the above two papers.

AFTERNOON:

Second Technical Session. Topic: "Electrodeposition." Chairman: Mr. R. W. Nicol.

2.15—4.45 p.m.

"Improved Techniques for Electrodeposition on Aluminium," by J. Edwards and C. J. Swanson (British Non-Ferrous Metals Research Association).

"Electroplating on Magnesium," by H. K Delong (Dow Chemical Co., U.S.A.).

Discussion on the above two papers.

"Complex Fluorides for the Deposition of Tin and Tin Alloys," by A. E. Davies, R. M. Angles and J. W. Cuthbertson (Tin Research Institute).

Discussion of the above paper.

"The Mechanisation of Electroplating Processes," by H. Silman (Ford Motor Co. Ltd.).

Discussion of the above paper.

EVENING:

7.00 p.m.

Dinner, Hotel Majestic.

8.00 p.m.

Civic Reception and Dance, Lounge Hall, Harrogate.

FRIDAY, APRIL 24

MORNING:

Third Technical Session. Topic: "Fundamental Electrode Processes." Chairman: Mr. P. A. Cartwright.

9.30—12.00 noon

"Structural and Kinetic Phenomena Observed during Anodic Polarisation," by Professor W. F. K. Wynne-Jones and H. Thirsk (King's College, Newcastle-upon-Tyne).

"The Rate-determining Process in the Anodic Dissolution of Metals," by A. Hickling (Liverpool University).

Discussion of above two papers.

11.00 a.m.

Coffee.

"Bright Metal Surfaces and a Theory of Bright Plating," by T. P. Hoar (Cambridge University).

Discussion of the above paper.

AFTERNOON:

2.15 p.m.

Works visit. British Screw Co. Ltd., Leeds, to see modern screw mill, new automatic horizontal barrelling plant for zinc plating, plant for ancillary finishes.

EVENING:

7.00 p.m.

Conference Dinner, Hotel Majestic, followed by Grand Coronation Masked Ball.

SATURDAY, APRIL 25

MORNING:

Fourth Technical Session. Topic: "Shop Practice." Chairman: Mr. W. F. B. Baker.

10.00—12 noon

Discussion on "Economy in the Plating Shop." Opened by S. Wernick.

NEW NITRIDING PLANT AT JAGUAR WORKS, COVENTRY

NITRIDING plant, manufactured by The General Electric Co. Ltd., has recently been installed in the Coventry Works of Jaguar Cars Ltd., where it is used for the surface hardening of crankshafts. The installation comprises a 56 kw. pit furnace provided with fully automatic temperature control and reading apparatus, switchgear, ammonia flow panel, dissociation testing cubicle, and two heat-resisting steel nitriding containers equipped with fans and forced convection assemblies.

The containers are loaded by suspending the charge of crankshafts vertically from a casting carried by the suspension bars attached to the insulated lid. The lid and charge are then lowered into the envelope and bolted into position. An absolutely gas-tight seal is formed by the rubber joint between the lid and envelope. A nitriding atmosphere is used to purge all air from the container before the container and charge are placed in the furnace.

The furnace is kept at a controlled temperature of 500° C., at which heat the ammonia reacts on the nitralloy steel crankshafts giving them a hard wear-resisting case. The depth of case is governed by the length of time the charge is held at temperature. A total heating cycle lasts from 60 to 70 hours, but during this period the plant requires very little supervision.

PROTECTING METAL SURFACES AGAINST CORROSION

TREATMENT of machinery parts and components, as new, with nickel or chromium to prevent corrosion and undue wear is finding increasing application in many different industries. Many firms are now adopting the wise precaution of having new equipment treated before use, thus eliminating the risks of corrosion and considerably reducing maintenance costs.

Heavy deposition, as introduced by Fescol Ltd., North Road, London, N.7, is particularly effective in this sphere as the nickel or chromium deposited becomes an integral part of the basis metal such as steel, cast-iron, bronze or copper. The adhesion is obtained by atomic attraction between the two metals, the blending or interlocking being so complete that subsequent separation is impossible.

Essentially, the articles to be treated are immersed in a solution, the principal ingredient of which is nickel sulphate, or chromic acid, for nickel or chromium deposits respectively, through which an electric current is passed. Atomic integration is obtained between the deposit and the material treated, and the current density and the temperature and composition of the solution are controlled on scientific lines.

Important from the industrial finishing point of view is that "Fescol"-ising can be employed to give a surface of a very high order to a cheap and easily-worked base. Errors in factory machining are rectified by this means, instead of scrapping the faulty part, and there are numerous other applications of a similar nature.

Nickel and chromium, either alone or in combination, cover practically every industrial requirement. Chromium, for example, is particularly successful for the treatment of plastic mouldings. A thin deposit prevents corrosion of the steel mould, resulting in the production of material with a uniformly high finish in the correct unstained colours and also prevents sticking in the mould. Nickel, being entirely non-toxic, provides an admirable surface for vessels employed in the preparation of foodstuffs of all kinds.

In the case of new equipment a deposit of only a few thousandths of an inch is normally sufficient to provide very considerable protection, while in repair work the deposit can be built up to any reasonable thickness, depending on the amount of wear that has taken place.

The firm's research and experimental laboratories are constantly engaged in finding new fields of application, and one of their latest achievements is to evolve a method whereby most types of aluminium alloy can be successfully treated with chromium, a problem that has hitherto proved extremely difficult of solution.

EFCO AT THE B.I.F.

THE Electro Chemical Engineering Co. Ltd., Netherby, Queens Road, Weybridge, are showing on their stand (C.611) an EFCO-Udylite Fully Automatic "Junior" Plating Machine operating mechanically. This is a low priced automatic of standard construction, having an output of up to 100 racks per hour, which corresponds to a surface area of 200 sq. ft. of work per hr. It is of the return type.

A wide range of process sequences can be incorporated within the overall dimensions of 28 ft. 6 in. long by 8 ft. 6 in. wide by 8 ft. 6 in. high. Normally the "Junior" is used for bright nickel, chromium, zinc, cadmium or brass plating or for various non-electrolytic processes. A hot air dryer is included.

Operation of the machine exhibited is pneumatic but hydraulically operated

For over 150 years···

Since 1802 Parsons have been makers of fine paints for all purposes. During this time they have always marched in the vanguard of scientific research and constantly striven after new and better formulas for paint products. Today — the name of PARSONS still proudly stands as a symbol for quality and durability and is still regarded as such by discriminating paint users everywhere.

the better finish for all good jobs— Parsons

THOS. PARSONS AND SONS LTD., 70, Grosvenor Street, London W 1. MAYfair 7951 (10 lines)
Branches: Beaconsfield, Birmingham, Brighton, Cardiff, Dublin, Edinburgh, Glasgow, Manchester, Plymouth & Southampton,

machines are also available. These machines are delivered complete to the customers' works and can be put into production in a few days. They are very suitable for export, being shipped as one unit.

Also shown is the latest design of EFCO-Udylite Fully Immersed Plating Barrels and samples plated in EFCO-Udylite processes.

"Glazement" to be Made in the Union

"Glazement," which has been extensively used in Britain for years, is now to be produced in South Africa. Messrs. Celon (Pty) Ltd., of Port Elizabeth, have acquired the South African rights from the British manufacturers, Robb Cement Enamel Finishes Ltd., of Dagenham, the rights extending over the whole of the Union and Southern Rhodesia.

Paint Problems in South Africa

THE Paint Laboratory of the South African Bureau of Standards is doing excellent work towards solving the many problems confronting paint manufacturers and paint users in the Union. The paint industry in the country has had to cope with enormous expansion in the manufacturing industries, with numerous demands for coatings for particular requirements.

The first step of the S.A.B.S. has been to standardise the raw ingredients of paint, and specifications have been prepared for red lead, zinc oxide, white lead, chrome pigments, linseed oils, tung oils, etc. During the six years of its existence the Bureau has brought out fifteen specifications relating to paints, and some sixty more requests are awaiting attention. Many of the pigments used in paint manufacture are obtainable in the country.

A miniature paint factory is contained in the Bureau's premises, where paints, varnishes and emulsions are made in small quantities. Samples of raw materials from all parts of the world are stored in this miniature paint factory.

Corrosion and weathering tests are continually being made at the Bureau, and the plant includes twin-arc weathering units, salt spray cabinets and a multi-purpose reflectometer.

NAMES IN THE NEWS

Appointments

THE Hymatic Engineering Co. Ltd., Redditch, Worcs., recently made two important appointments. **Mr. D. G. B. Mountford** who was formerly in charge of the company's export sales department, is now assistant production controller. He was in service with the Royal Navy on radar work and became an executive officer on the staff of the C.-in-C., British Pacific Fleet, during the war. Mr. Mountford, who holds the Diploma in Industrial Administration of the Birmingham College of Technology, entered the company in 1946.

Mr. Faraday, succeeding Mr. Mountford, is Hymatic's new export manager. He has had experience in all departments of the company and has spent the past five years on development work. He is an Associate Member of the Institute of Export and a Founder Student of the Department of Industrial Administration at the Birmingham College of Technology.

The Hymatic Engineering Co. Ltd., who manufacture compressed air equipment, have given a chance to youth, for both appointments take place at thirty years of age.

PETROCHEMICALS LTD., of Partington Industrial Estate, Urmston, Manchester, recently opened a new laboratory block. This photograph was taken during an informal moment at the opening and shows, from left to right: Dr. H. Raudnitz, Chief Research Chemist; Sir Robert Robinson, O.M., F.R.S., a director of Petrochemicals Ltd. (who officiated at the opening); Dr. E. T. Borrows, Chief Chemist; Mr. W. E. Huggett, Technical Manager.

AIR-CONTROL INSTALLATIONS LTD., Ruislip, Middlesex, announce the appointment of **Mr. H. D. Roberts,** A.C.C.A., as a director of the company. Mr. Roberts, who will continue to act as secretary of the company, has occupied that position since the firm was formed in 1935, and his enthusiasm and energy have contributed substantially to the growth of the company since that date.

DURESCO PRODUCTS LTD., announced recently that they have appointed **Mr. A. E. G. Brown** as general manager: he came to the company as works manager and chief chemist in 1950. He entered the paint industry with Lewis Berger in 1932, and was subsequently with Sherwoods and Nicholls and Clarke until he joined his present company.

Institute of Metal Finishing —Organic Section

THE following were appointed to the committee of the Organic Finishing Group for 1953/54: **Mr. J. N. T. Adcock,** Development Manager, I.C.I. Paints Division, Slough; **Mr. W. E. Cattley,** Sales Manager, The Walterisation Co. Ltd., Croydon; **Mr. J. Dixon,** Process Chemist, Standard Motor Co. Ltd., Coventry; **Mr. H. J. Mason,** Assistant Chief Chemist and Metallurgist, Vauxhall Motors Ltd., Luton; **Mr. S. J. Scouse,** Field Supervisor, The Pyrene Co. Ltd., Metal Finishing Division, Wembley; **Mr. W. Stein,** Senior Development Chemist, Joseph Lucas (Industries) Ltd., Birmingham; **Mr. R. L. Yeates,** Chief Chemist, Docker Brothers, Birmingham; and **Mr. A. A. B. Harvey,** Briggs Motor Bodies Ltd., Dagenham.

Retirements

Mr. W. A. South, managing director of Redaluma Paint Co. Ltd., retired from that position at the end of March. His son, **Mr. Godfrey South,** who has been assistant manager for a number of years, takes over as general manager. Mr. W. A. South, who has seen service with the company for more than thirty years, remains on the board.

Mr. W. K. Davey resigned recently from the board of Associated Lead Manufacturers on reaching retiring age after completing forty-two years with the company and its forerunner, the Cookson Lead and Antimony Co. Ltd., with which he served as London Manager. Mr. Davey is chairman of the London Metal Exchange Committee.

A UNIQUE PRESENTATION

WM. HARLAND AND SON LTD.'S boardroom at Merton, S.W.19, was the scene of a unique presentation when twenty-two of the company's employees received gold watches and clocks to mark the completion of not less than twenty-five years of service.

The presentations were made by Mr. D. R. Russell, managing director, who was accompanied by Mr. J. Benson, secretary and general manager, to the following employees (years of service in parentheses): A. W. Bond (40), J. H. Cook (36), G. Corke (49), D. J. Gallant (25), A. G. Hines (46), W. B. Lewin (25), F. A. Roots (47), W. J. White (50), J. J. Wilks (40), G. L. Woods (27), H. J. Band (32), P. J. Cayley (39), F. Flint (27), A. D. Gilbreath (32), H. J. Greenaway (33), A. E. Hines (33), C. H. J. Siviour (62), L. F. Wadmore (25), W. Wadmore (33), E. V. Webb (47), W. C. G. Wren (33). Silver salver, A. J. Langhorne (33).

Fittingly, the first presentation was made to Mr. C. H. J. Siviour, now 76, who has been with the firm for 62 years, and is still actively engaged on experimental work in the company's laboratories. Wm. Harland have been manufacturing paints and varnishes since 1791, holding the Royal Warrant since 1900.

OBITUARY

Mullard Ltd. announce the loss by death of a technical executive of their valve division, **Mr. H. L. Bowen.** He was taken ill during the sea voyage for a five-week visit to the U.S.A. On arrival he was taken to hospital with bronchial pneumonia which was followed by the development of further complications. Mr. Bowen was on his way to represent the British Radio Valve Manufacturers' Association at the Joint Electron Tube Engineering Council Conference in Atlantic City. Towards the close of 1952 he celebrated twenty-five years' service with his company which he originally joined as an outside technical representative in 1927. His work was extensive, and as assistant to **Mr. T. E. Goldup,** he helped to form the company's technical service department. In addition to his interest in the B.R.V.M.A., Mr. Bowen was a member of various British Standard Institute committees.

Mr. Francis William Lewis, director of A. Boake, Roberts and Co. Ltd., died on 15th March after nearly sixty years' service with the company which he joined in 1894. Mr. Lewis, who was actively engaged with the company until his illness in November, 1952, was largely responsible for their entry into the manufacture of fine chemicals.

Mr. A. L. Stokes, who died recently at the age of fifty-four years, was director and works manager of Griffiths Bros. and Co., London Ltd. Joining the company as an office boy in 1914, he later undertook various positions of responsibility and received his appointment to the board in 1939. During this time he held the position of maintenance manager and subsequently undertook the duties of works management.

Mr. Alec Walter Ayling, who was a director of Blundell Spence and Co. Ltd., died early in March at the age of sixty-eight years. He joined the company in 1899 and was managing director until his retirement in 1945 after which he continued on the board in an advisory capacity. Mr. Walter was deeply interested in trade matters and played an active part with the Council of the National Paint Federation, the London Association and the National Joint Industrial Council for the Paint Industry.

Mr. Edward Richardson, who was managing director of the Richardson Printing Ink Co. Ltd., Lintzford, Rowlands Gill, Co. Durham, died recently after twenty-five years in that position.

Mr. R. P. Dodwell, whose death occurred on 6th March, was chairman of Norman, Smee and Dodwell Ltd., Mitcham, for many years.

FOR SALE

B.T.H. INFRA-RED OVEN, laboratory size, complete with reflectors, etc., for quick sale. Full details Box No. 70, INDUSTRIAL FINISHING, 157 Hagden Lane, Watford, Herts.

APPOINTMENTS VACANT

CHEMISTS with experience in the paint industry required by well-known company in London. Generous salary on progressive scale with opportunity to broaden experience in industry and trade fields. Reply in strict confidence to Box No. 71, INDUSTRIAL FINISHING, 157 Hagden Lane, Watford, Herts, giving details of experience.

APPOINTMENT WANTED

MANAGING CHEMIST, sixteen years plating, anodising and spray painting, seeks responsible position.—Box No. 72, INDUSTRIAL FINISHING, 157 Hagden Lane, Watford, Herts.

BUSINESS & TECHNICAL ● *Problems Answered !*

INDUSTRIAL FINISHING YEAR BOOK 15/- post free

REGISTER OF THE GAS INDUSTRY 21/- post free

WHO'S WHO IN THE GAS INDUSTRY 5/- post free

● How to do it ● What to buy ● Where to buy

ARROW PRESS LTD · 157 HAGDEN LANE · WATFORD

This is an Arrow Press Publication. Published Monthly.
Subscription Rate 30s. per annum.
Published by Arrow Press Ltd. at 157 Hagden Lane, Watford, Herts.
Telegrams: "Techpress, Watford." Telephone: Gadebrook 2308/9.

MADE AND PRINTED IN GREAT BRITAIN FOR THE PROPRIETORS, ARROW PRESS LTD., BY THE SIDNEY PRESS LIMITED, LONDON AND BEDFORD.

ADVERTISERS' INDEX

Aerospray Manufacturing Co. Ltd., The .. —
Aerograph Co. Ltd., The 602
Air Industrial Developments Ltd. 606
Allied Paints and Chemicals Ltd. .. .. —
Ashton and Moore (Metal Colourers) Ltd. .. —
Atlas Diesel Co. Ltd. .. .. —
Atlas Plating Works Ltd. 675
Ault and Wiborg Group .. .. .. —

Ballard, F. J. and Co. Ltd. .. .. *Cover* iii
Bennett (Hyde) and Co. Ltd. .. .. —
Berger, Lewis (Great Britain) Ltd. .. .. —
Bratt Colbran Ltd. 608
British Hydrological Corporation 605
British Oxygen Co. Ltd. 611
British Paints Ltd. .. .. .. *Cover* iv
British Vapour Blast Ltd. .. .. .. —
Brough, E. A. and Co. Ltd. .. .. .. —
Bullows, A. and Sons Ltd. .. .. .. —

Canning, W. and Co. Ltd. 603
Carrier Engineering Co. Ltd. .. .. —
Cellon Ltd. .. .. —
Classified Advertisements 674
Controlled Heat and Air Ltd. .. .. —
Croda Ltd. .. .. —
Cruickshank, R. Ltd. 651

De La Rue, Thomas and Co. Ltd. .. .. —
Delta Technical and Commercial Services .. 606
Drummond Patents (Holdings) Ltd. .. 643

Electric Construction Co. Ltd., The .. —
Electro-Chemical Engineering Co. Ltd., The —

Fletcher Miller Ltd. .. .. —
Fuel Economist 667

Gas Council, The 601
General Electric Co. Ltd., The .. .. —
General and Industrial Paints Ltd. .. .. —
Gittings and Hills Ltd. 649
Goldsworthy, Thomas and Sons Ltd. .. —
Goodlass, Wall and Co. Ltd. 631
Grauer and Weil Ltd. 676
Griffiths, A. E. (Smethwick) Ltd. 604

Hall, John and Sons (Bristol and London) Ltd. 653
Hawley, John and Co. (Walsall) Ltd. .. 609
Heat and Air Systems Ltd. .. .. .. —
Hockley Chemical Co. Ltd., The .. .. —
Holden, Arthur and Sons Ltd. .. .. —
Honeywell-Brown Ltd. .. .. —

Imperial Chemical Industries Ltd. (Paints Division) .. .. —
Incandescent Heat Co. Ltd. .. .. .. —
Ingham Clark, Robert and Co. .. .. —
International Paints Ltd. 614
Ionic Plating Co. Ltd. .. .. —

Jenolite Ltd. .. .. —
Jenson and Nicholson Ltd. .. .. .. —

Kaylee Transfers Ltd. 608
Kearsley, Robert and Co. 610

Learner, A. and Co. Ltd. .. .. .. —

McDowell, Thomas and Co. Ltd. .. .. —
Macpherson, Donald and Co. Ltd. .. .. —
Mander Bros. Ltd. 612
Metallisation Ltd. .. .. —
Metal Porcelains Ltd. .. .. —
Metal Processes Ltd. 637
Metropolitan-Vickers Electrical Co. Ltd. .. —
Micafine Ltd. 627
Midland Galvanizers Ltd. .. .. .. —
Minnesota Mining and Manufacturing Co. Ltd. .. .. —
Modern Industrial Ventilation and Oven Co. Ltd. .. .. —
Morris, B. O. Ltd. 623

Neil and Spencer Ltd. .. .. —
Norgren, C. A. Ltd. .. .. —

Parkinson and Cowan (Gas Meters) Ltd. .. —
Parsons, Thomas and Sons Ltd. 671
Perfectair Ltd. .. .. —
Pinchin, Johnson and Associates Ltd. *Cover* i
Postans Ltd. .. .. —
Preston, John and Co. Ltd. .. .. .. —
Prodorite Ltd. .. .. *Cover* ii
Pyrene Co. Ltd., The 629

Scrib Ltd. (Metal Section) .. .. .. —
Shell Chemicals Ltd. 607
Spencer and Halstead Ltd. .. .. .. —
Stordy Engineering Ltd. .. .. .. —
Sunbeam Anti-Corrosives Ltd. 633

Tack All Tackrag (Eng.) Ltd. .. .. .. —
Technical Brushes Ltd. .. .. —
Teleflex Products Ltd. .. .. —
Thornley and Knight Ltd. .. .. .. —
Titanine Ltd. .. .. —
Trapinex Ltd. .. .. —

Walterisation Co. Ltd., The 610

APW
VAT AND BARREL PLATING of Chrome, Nickel, Brass, Copper, Zinc, Bright Zinc, Silver, Gold, Cadmium, etc.
Anodising, Bright Dipping, Bronzing, Frosting Aluminium, Polishing and Lacquering, Plating and Bronzing on Aluminium.
ROTO-FINISHING for BURNISHING and DEBURRING.
PROTECTIVE FINISHES FOR ARMAMENTS.
HARD CHROME ELECTRO-FORMING.
ATLAS PLATING WORKS LTD., Avenue Rd., Acton, W.3. ACORN 1102 (3 lines)
Barrel Plating Works, 8/10 INGATE PLACE, Queenstown Rd., Battersea. Macaulay 2976
APW

ATLAS PLATING WORKS LTD

G&W LTD

PERFECT POLISHING FOR METALS AND PLASTICS

★ PLEATED MOPS IN VARIOUS GRADES.
PATENT NO. BLF. 632540

★ NO. 3 TRIPOLI. A SUPERIOR POLISHING COMPOSITION FOR BRASS, COPPER AND OTHER METALS.

★ NO. 4 WHITE FINISH. FOR GIVING A HIGH FINISH TO NICKEL, BRASS, SILVER ETC.

GRAUER & WEIL LTD.

ESTABLISHED 1892

HARDWICK STREET, LONDON, E.C.1. Phone: TERMINUS 2434 (2 lines) Grams: GRAUERS SMITH, LONDON

MANUFACTURERS AND SUPPLIERS OF COMPLETE ELECTRO PLATING PLANTS INCLUDING RECTIFIERS, TANKS, ANODES, SALTS AND CLEANERS